COLLINS

overhaul manual

(with illustrated parts catalog)

Cedar Rapids Division | Collins Radio Company, Cedar Rapids, Iowa

51RV-1

VOR/ILS Receiver

900Y

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(D) Collins type number, name and serial number of principal equipment
(E) Unit subassembly number (where applicable)

ERRATA SHEET NO. 1

FOR

51RV-1 VOR/ILS RECEIVER OVERHAUL MANUAL

(Collins part no. 523-0736003-211113, dated 15 July 1963 with the second revision dated 1 March 1965)

Revision No. 2 to the 51RV-1 Overhaul Manual included relocation of two trouble-shooting block diagrams for the 344A-2, and this involved changing several figure references. However, these block diagrams should be kept in their original location, facing the 344A-2 over-all schematic and illustrations depicting parts location. The following changes are required to make the above illustration placement and will be included in the next revision to the 51RV-1 Overhaul Manual.

PAGE	CHANGE
814	Change the page number of this foldout to 816 and insert facing page 817/818. Change figure 805 to 809 and figure 806 to 810.
815/816	Change the page number of this foldout to 813/814. Change figure 807 to 805, figure 808 to 806, and figure 809 to 807.
vi	Change the list of illustrations according to the above renumbering.
705	Change step C. (5) to call out two 1000-ohm resistors.
711	Change figure reference as follows: Step D. (1) - Figure 806 to 807.
712	Change figure references in paragraph E. (1) as follows: Step (a) - Figure 806 to 807 (b) - Figure 807 to 806 (d) - Figure 807 to 806 (twice) (e) - Figure 806 to 807 (g) - Figure 806 to 807 (h) - Figure 806 to 807 (i) - Figure 806 to 807 and figure 807 to 806.
714	Change figure references as follows: Step (m) - Figure 808 to 807 (n) - Figure 808 to 807 (p) - Figure 808 to 807 (q) - Figure 809 to 806 (r) - Figure 808 to 807 (w) - Figure 809 to 806

1 April 1965
523-0736003-211113

PAGE	CHANGE
715	Change figure references as follows: Step (4)(a) - Figure 809 to 807 (4)(b) - Figure 809 to 807 (6)(a) - Figure 808 to 807
716	Change figure references as follows: Step (7)(b) - Figure 809 to 806 (9)(a) - Figure 809 to 806
717	Change figure references as follows: Step (10)(b) - Figure 808 to 807 F. (2) - Figure 808 to 807 F. (4) - Figure 809 to 806
725	Change figure reference as follows: Step J. (4) - Figure 102 to 101. Add (left deflection on deviation indicator) at end of step I. (4) and (right deflection on deviation indicator) to I. (5).
801	Change figure references as follows: Paragraph 2 - ...stage gain block diagrams (803, 804, 805, 806, and 807) to (803, 804, 805, 809, and 810). Step 2. E. - Figures 805 and 806 to 809 and 810.
810	Change figure reference as follows: Step B. (2)(d) - Figure 807 to 805
811	Change figure references as follows: Step (2)(e) - Figure 810 to 808 (3)(d) - Figure 809 to 806 (3)(e) - Figure 807 to 805 (3)(h) - Figure 807 to 805 (4)(b) - Figure 805 to 809 Change (5)(b) to read -...test points TP18 through TP24 (figure 810) and test points TP9, TP10, TP12 (figure 809).
812	Change figure reference as follows: Step (6)(e) - Figure 806 to 810.

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51RV-1
VOR/ILS Receiver

This manual includes:

51RV-1 Overhaul Manual (34-35-0)	*523-0736003*
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VOR/ILS Receiver

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OVERHAUL MANUAL

Record of Revisions

51RV-1 VOR/ILS Receiver	LOCATION
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1	June 1/64						
2	Mar 1/65						

RETAIN THIS RECORD IN THE FRONT OF MANUAL OR CHAPTER.

ON RECEIPT OF REVISIONS, INSERT REVISED PAGES IN THE MANUAL, AND ENTER DATE INSERTED AND INITIALS.

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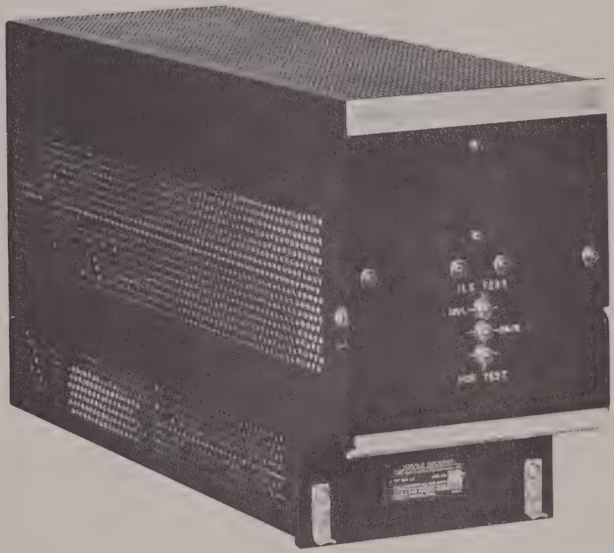

ILS TEST
VOR TEST

51RV-1 VOR/ILS Receiver
Figure 1

51RV-1 VOR/ILS Receiver - Description and Operation

1. GENERAL.

A. Purpose of Manual.

This manual provides information required to overhaul the 51RV-1 VOR/ILS Receiver. Included is a description of the equipment, detailed theory of operation, detailed disassembly, cleaning, inspection, repair, and assembly instructions, detailed testing, trouble-shooting procedures, storage, and information on special tools, fixtures and test equipment required for overhaul. The 51RV-1 is shown in figure 1. Figure 2 lists the equipment covered in this manual.

51RV-1 MODEL	COLLINS PART NUMBER	DIMENSIONS (in.)			WEIGHT (lb)
		WIDTH	LENGTH	HEIGHT	
Includes VOR self-test and powerflag amplifiers	522-2450-00	4-3/4	14-5/8	7-1/2	18.5
Includes VOR self-test, powerflag and RMI servo amplifiers	522-2450-011	4-3/4	14-5/8	7-1/2	18.6
Includes VOR self-test and RMI servo amplifier	522-2450-012	4-3/4	14-5/8	7-1/2	17.9
Includes VOR self-test	522-2450-013	4-3/4	14-5/8	7-1/2	17.9
Includes VOR and ILS self-test and powerflag amplifiers	522-2450-014	4-3/4	14-5/8	7-1/2	17.9
Includes VOR and ILS self-test, powerflags, and RMI servo amplifier	522-2450-015	4-3/4	14-5/8	7-1/2	19
Includes VOR and ILS self-test and RMI servo amplifier	522-2450-016	4-3/4	14-5/8	7-1/2	18.4
Includes VOR and ILS self-test	522-2450-018	4-3/4	14-5/8	7-1/2	18.3

Table of Equipment Covered in This Manual
Figure 2

B. Purpose of Equipment.

The 51RV-1 VOR/ILS Receiver accepts VOR, localizer, and glide slope signals and provides outputs to operate deviation, flag, to-from indicators, and an audio output. The 51RV-1 consists of a 51V-4B Glide Slope Receiver, a 51X-4 VOR/LOC Receiver, a 344A-2 Manual VOR/LOC Instrumentation Unit, a 344F-1 Automatic VOR Instrumentation Unit, a T-frame for support of these units, and a one piece dust cover. The 51RV-1 receivers with Collins part numbers 522-2450/014/015/016/018 contain ILS self-test.

Both receivers employ two-out-of-five binary switching for frequency selection. Glide slope and localizer pairing is accomplished automatically and independently from a common control unit. The 51X-4 provides 200 channels with 50-kc spacing. The 51V-4B provides 20 channels with 300-kc spacing.

Four models of the 51RV-1 (see figure 2) contain power flag circuitry to operate a master glide slope and VOR/LOC alarm system. The outputs from these circuits are in addition to the standard indicator flag outputs.

Four models of the 51RV-1 (see figure 2) contain a servo amplifier module. This module receives an input from a magnetic compass system and supplies an output to drive an RMI compass card motor.

All models of the 51RV-1 (see figure 2) contain VOR self-test circuitry. This circuitry is used to test the VOR circuitry of the 51RV-1.

Four models of the 51RV-1 (see figure 2) contain an ILS self-test module. This module provides a signal to test the audio stages and indicators in the ILS system.

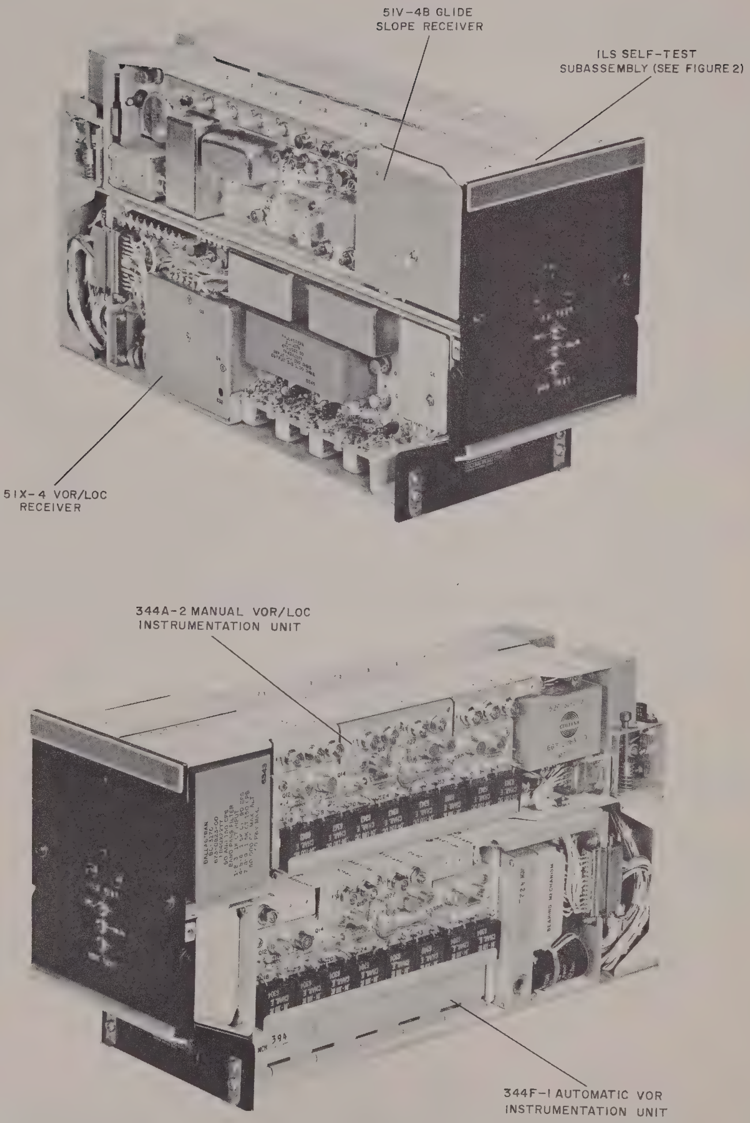
The 51RV-1 units are listed in figure 3 and illustrated in figure 4.

UNIT	FUNCTION	COLLINS PART NUMBER	DIMENSIONS (in.)			WEIGHT (lb)
			WIDTH	LENGTH	HEIGHT	
51V-4B	Glide Slope Receiver	522-3195-00	2-9/64	12-5/8	3-9/64	3.3
51X-4	VOR/LOC Receiver	522-3196-00	2	12-5/16	4-3/16	3.6
344A-2	Manual VOR/LOC Unit	522-2494-00	2-9/64	13-1/4	3-7/64	4.2
344F-1	Automatic VOR Unit	522-3197-00 (with RMI servo amplifier) 522-3197-011 (without RMI servo amplifier)	2-1/16	12-3/4	4-1/4	4.0

Table of 51RV-1 Units (Sheet 1 of 2)
Figure 3

UNIT	FUNCTION	COLLINS PART NUMBER	DIMENSIONS (in.)			WEIGHT (lb)
			WIDTH	LENGTH	HEIGHT	
ILS self-test module	Provides test for ILS sections	756-3816-005	11/32	12-15/32	3-3/32	0.4
T-frame	Support for above units (without ILS self-test)	553-6534-015 (with power flags) 553-6534-005 (without power flags)	4-7/8	14-5/8	7-5/8	3.4
	Support for above units (with ILS self-test)	756-3838-015 (with power flags) 756-3838-005 (without power flags)				

Table of 51RV-1 Units (Sheet 2 of 2)
Figure 3


51V-4B GLIDE
SLOPE RECEIVER
ILS SELF-TEST
SUBASSEMBLY (SEE FIGURE 2)
51X-4 VOR/LOC
RECEIVER
344A-2 MANUAL VOR/LOC
INSTRUMENTATION UNIT
344F-1 AUTOMATIC VOR
INSTRUMENTATION UNIT

51RV-1 VOR/ILS Receiver, Left and Right Oblique Views
Figure 4

Figure 5 is a list of the associated equipment which may be used with the 51RV-1.

EQUIPMENT	COLLINS PART NUMBER	DESCRIPTION	FUNCTION
37P-4 Antenna	522-0688-013	For use with single glide slope receiver. 0.7 lb.	Receives glide slope navigation signals (uhf).
37P-5 Antenna	522-0700-003	For use with two glide slope receivers. 0.7 lb.	Receives glide slope navigation signals (uhf).
Type N Coaxial Plug	557-9040-00	UG-21B/U, 0.1 lb.	Antenna connector.
BNC-to-N Adapter	357-9056-00	UG-201/U, 0.1 lb.	For use with 37P-4 Antenna.
37J-3 Antenna	505-6800-00	VOR/LOC Antenna, 5.75 lb.	Receives VOR/LOC navigation signals (vhf).
313N-1 Control 313N-2 Control 313N-3 Control	*522-2446-024 *522-2447-005 *522-2448-005	Remote control.	Provides remote frequency, volume and self-test control.
329B-4B Approach Horizon	522-0960-005	Used with FD-105 and AP-103, 4.2 lb.	Provides aircraft position with respect to glide slope beam and computed lateral guidance steering information.
331A-4A Course Indicator	522-0890-005	Used with FD-105 and AP-103, 4.8 lb.	Provides pictorial display of aircraft position with respect to localizer course or omni-range radio.
Radio Magnetic Indicator (RMI)			Provides magnetic heading and station bearing information.
390Y-1 Mount	522-3060-00	Shockmount, 1.7 lb.	Provides shock mounting for the 51RV-1.

*For detailed information and optional controls refer to 313N-1/2/3 instruction books.

Table of Associated Equipment
Figure 5

C. Associated Equipment Publications.

Figure 6 lists other publications concerning the 51RV-1 and associated equipment. Maintenance manuals contain complete installation and cabling information, preinstallation testing procedures, and line maintenance procedures.

PUBLICATION	COLLINS PART NUMBER
51RV-1 VOR/ILS Receiver Maintenance Manual	523-0736004
313N-1 Control Instruction Book	523-0722000
313N-2 Control Instruction Book	523-0754001
313N-3 Control Instruction Book	523-0752001
329B-4B Approach Horizon Instruction Book	523-0755030
331A-4A Course Indicator Instruction Book	523-0755029

Table of Associated Equipment Publications
Figure 6

2. EQUIPMENT SPECIFICATIONS.

Figure 7 is a table of the 51RV-1 characteristics and specifications. The 51RV-1 meets TSO - C36a, C40a, and C34a requirements.

CHARACTERISTIC	SPECIFICATION
TSO Compliance	C34a, C36a, C40a (Category A)
Power Requirements	
VOR Operation	27.5 volts d-c, 1.45 amperes 26 volts 400 cps, 0.23 ampere
ILS Operation	27.5 volts d-c, 1.82 amperes 26 volts 400 cps, 0.23 ampere

Table of Equipment Specifications (Sheet 1 of 3)
Figure 7

CHARACTERISTIC	SPECIFICATION
Environmental Requirements	
Temperature	
Continuous Operation	-54°C to +55°C (-65°F to +131°F)
Intermittent Operation (30 minutes maximum)	Up to +71°C (+160°F)
Storage	-65°C to +85°C (-85°F to +185°F)
Humidity	Up to 95 percent at 50°C (+122°F) for 48 hours with moisture condensation on equipment once each hour.
Altitude	Up to 45,000 feet.
Shock	
Receiver in Shockmount	15g Operating; 30g Impact. (10 milliseconds duration)
Receiver in Rigidmount	6g Operating; 15g Impact. (10 milliseconds duration)
Vibration	
Receiver in Shockmount	0.08 inch double amplitude, 5 to 10 cps; 0.42g, 10 to 15 cps; 0.036 inch double amplitude, 15 to 65 cps; constant 8g, 65 to 500 cps.
Receiver in Rigidmount	0.02 inch double amplitude, 5 to 55 cps with 3g maximum, constant 1.5g, 55 to 500 cps.
VOR/LOC Performance	
Frequency Range	108.00 to 117.95 mc in 50-kc increments.
Sensitivity	
Aural Channel	3-microvolt input for 6-db S+N/N ratio
VOR Channel	3-microvolt input for satisfactory navigation performance.
Selectivity	50 kc at 6-db points and 65 kc at 60-db points with 3 db or less ripple.
Spurious Response	At least 70 db down.
Gain	100-milliwatt output into a 600-ohm load with a 5-microvolt input signal modulated 30 percent with 1000 cps.
AGC Characteristics	3-db variation from 5 microvolts to 50,000 microvolts.

Table of Equipment Specifications (Sheet 2 of 3)
Figure 7

CHARACTERISTIC	SPECIFICATION
Frequency Stability	0.004 percent from 10°C to 55°C (50°F to 131°F) 0.005 percent from -55°C to +71°C (-67°F to 160°F).
Navigation Outputs	5 deviation indicator loads, 4 flag indicator loads, 2 TO-FROM loads and 2 RMI pointer loads.
Glide Slope Performance	
Frequency range	329.3 to 335.0 mc in 300-kc increments.
Selectivity	140 kc minimum at 6-db points, 450 kc maximum at 60-db points.
Sensitivity	20-microvolt input with a 2-db audio ratio required to obtain a 47-microampere deflection (course sensitivity set at 78-microamperes deflection for standard glide slope deviation input)
Spurious Response	At least 60-db down in the 0.09- to 1500-mc range.
AGC Characteristic	Adjustable to vary audio rise from +5 percent to -15 percent when input is increased from 700 to 14,000 microvolts.
Frequency Stability	0.01 percent from -55°C to +71°C (67°F to +160°F).
Navigation Outputs	5 deviation indicator loads and 4 flag indicator loads.
ILS Test Operation	27.5 volts d-c +10% -20% .14 amperes maximum.
Frequency Stability	-20°C to +55°C (-4°F to 131°F) ±1% max, ±0.5% typical. -55°C to 71°C (-67°F to 160°F) ±2% max, ±1% typical.
Deviation Stability	-20°C to +55°C (-4°F to 131°F) ±15% max, 7% typical. -55°C to +71°C (-67°F to 160°F) ±20% max, 12% typical.
Range of Adjustment:	
Master Oscillator Frequency	445 - 455 cps.
Localizer Deviation Current	50 - 150 ua load.
Localizer Flag Current	200 - 400 ua load.
Glide Slope Deviation Current	50 - 150 ua load.
Glide Slope Flag Current	200 - 400 ua load.

Table of Equipment Specifications (Sheet 3 of 3)
Figure 7

3. THEORY OF 51RV-1 OPERATION.

A. Equipment Description.

(1) 51V-4B Glide Slope Receiver.

The 51V-4B receives glide slope r-f signals in the 329.3- to 335.0-mc frequency range. It detects and compares the 90- and 150-cps modulation signals, and provides outputs for the glide slope deviation needle and flag alarm of the course indicator.

(2) 51X-4 VOR/LOC Receiver.

The 51X-4 receives VOR/LOC r-f signals in the 108.00- to 117.95-mc frequency range. It detects the aural and VOR/LOC audio signals. The aural signals are coupled to the aircraft intercom system, and the VOR/LOC signals are coupled to the instrumentation units.

(3) 344A-2 Manual VOR/LOC Instrumentation Unit.

In localizer mode the 344A-2 compares the amplitude of the localizer 90- and 150-cps modulation signals detected in the 51X-4 and provides d-c outputs for the localizer deviation needle and flag alarm of the course indicator. In the VOR mode the reference 30-cps signal is demodulated from the 9960-cps subcarrier in the 344A-2 FM circuitry. A phase detector detects the phase difference between the reference and variable 30 cps and provides d-c outputs for the VOR deviation needle and flag alarm of the course indicator. Another phase detector provides a d-c output for the to-from indicator. The 344A-2 also contains VOR self-test circuitry that provides a check for the reference and variable 30-cps channels in both the manual and automatic instrumentation unit.

(4) 344F-1 Automatic VOR Instrumentation Unit.

The 344F-1 compares the phase difference between the variable 30 cps and the demodulated reference 30 cps (from the 344A-2) and provides a synchro output to drive a needle in the radio magnetic indicator (RMI).

(5) ILS Self-Test.

The ILS self-test provides a 90- and 150-cps signal that can be used to check the ILS receiver system accuracy from the first audio stages through the indicators. When the UP/LEFT switch is actuated, the deviation bar moves to the left, the glide slope bar moves up, the VOR/LOC flag disappears, and the glide slope flag disappears. When the DOWN/RIGHT switch is actuated, the deviation bar moves to the right, the glide slope bar moves down, and the VOR/LOC flag disappears. The ILS self-test circuit can be actuated on ILS channels only.

B. Theory of Ground Facilities.

(1) ILS Principle.

(a) Radiation Pattern.

Two separate ground radio systems radiate the glide slope and localizer patterns by complex antenna arrays located near the airport runway. The glide slope signal, 329.3 to 335.0 mc, is radiated to effectively produce two intersecting lobes, one above the other. The upper lobe is predominantly modulated with 90 cps, and the lower lobe is predominantly modulated with 150 cps. On a line at an angle of 2.5 to 3 degrees from the ground, the two audio signals are equal. This line of equal modulation defines the glide path and is shown in figure 8. The receiver detects and compares the 90 and 150 cps, and applies outputs to the glide slope deviation needle and flag alarm on the course indicator. This provides vertical guidance for the pilot when making an approach to the runway. When making an approach to the runway, the pilot receives horizontal guidance from the localizer deviation needle and flag alarm on the course indicator. A receiver detects and compares two audio signals radiated by the localizer antenna array and provides the output to the course indicator. Two intersecting lobes are effectively produced and each is directed along one side of the runway. The lobe to the left is predominantly modulated with 90 cps, and the lobe to the right is predominantly modulated with 150 cps. The two audio signals are equal along a line bisecting the center of the runway. The line of equal modulation defines the localizer course and is shown by the vertical plane in figure 8.

(b) ILS Operation. (Refer to figure 8.)

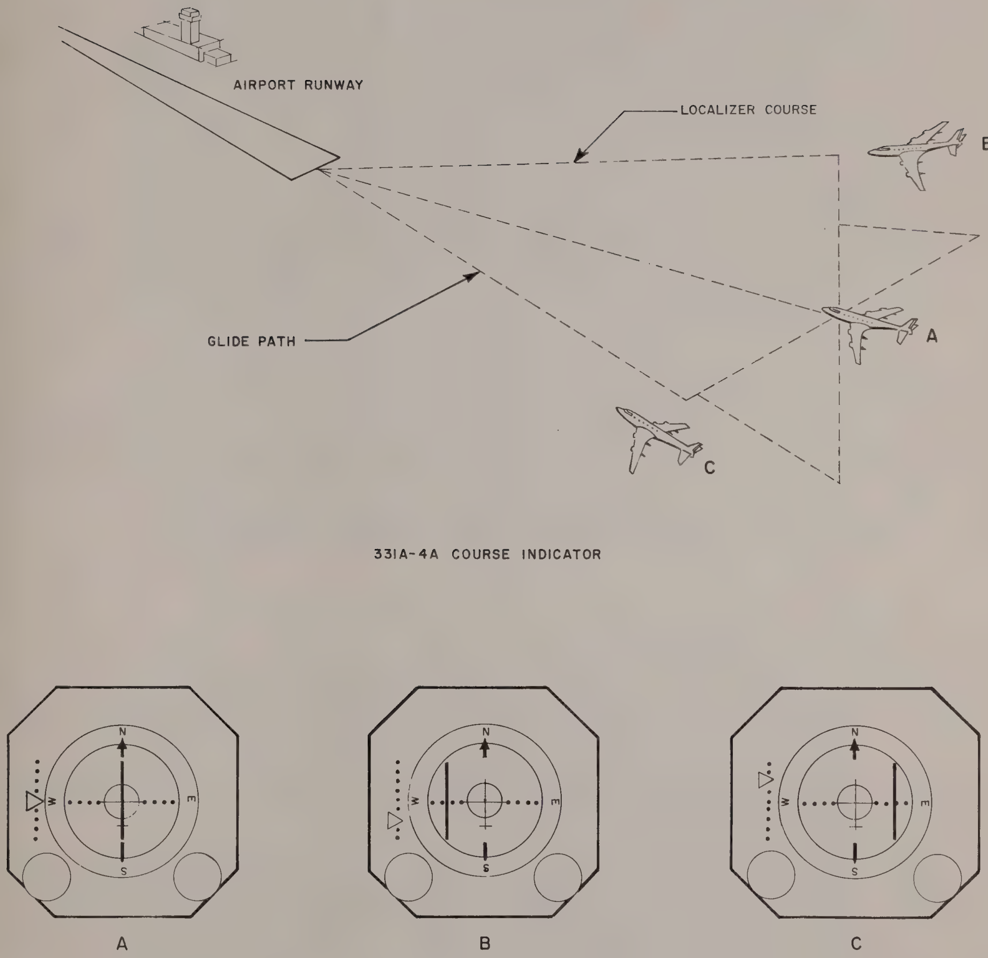
Audio signals of equal modulation are received and compared by the glide slope and localizer receivers when the aircraft is flying on the intersecting lines of the horizontal (glide path) and vertical (localizer course) planes. The glide slope and localizer deviation needles are centered by the receiver outputs as shown for the aircraft at position A. When the aircraft is to the right of the localizer course, a stronger 150-cps signal will be detected, providing an output to deflect the localizer deviation needle to the left. The glide slope deviation needle will deflect down when the aircraft is above the glide path where the 90-cps signal is stronger. The instrument for the aircraft at position B illustrates the above conditions. The localizer deviation needle will deflect to the right, and the glide slope deviation needle will deflect up when the aircraft is at position C where the localizer 90-cps signal is stronger and the glide slope 150-cps signal is stronger.

(2) VOR Principle.

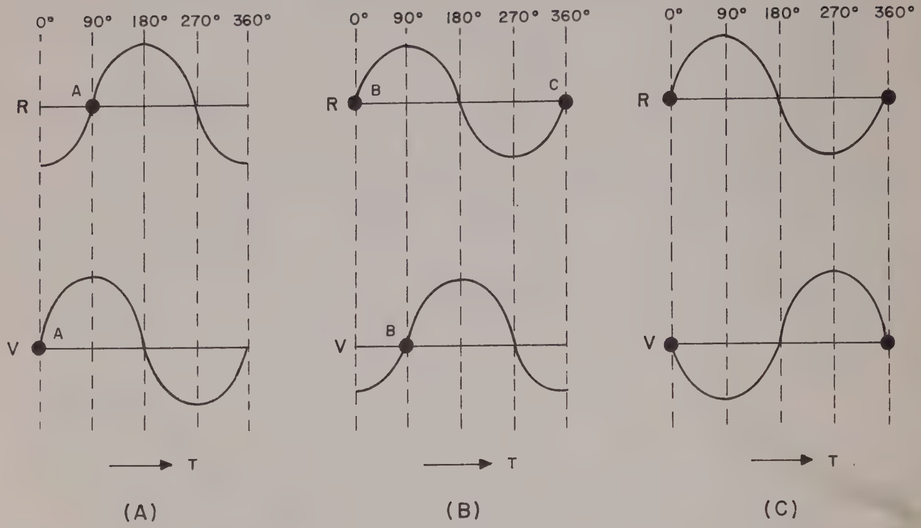
(a) Sine Wave Comparison.

Sine waves will be used to illustrate the radiation of the VOR audio signals and to compare the phase differences of the two audio signals (30 cps) in the 51RV-1. Figure 9 illustrates how the phases of the audio signals are compared. At point (A) in figure 9 signal V passes through the reference line in a positive direction, 90 degrees before signal R. In this condition V is said to be leading R by 90 degrees.

Signal R is leading signal V by 90 degrees in figure 9 (B) (note points B). If point C of signal R is compared with point B of signal V, signal R will be lagging by 270 degrees. From this comparison we note that one signal will lead another signal by an X number of degrees or lag by (X +180) degrees. The relationship will be determined by the points compared on the reference line. Figure 9(C) illustrates signals R and V when they are 180 degrees out of phase. Either signal is leading or lagging the other by 180 degrees.


AIRPORT RUNWAY
LOCALIZER COURSE
B
GLIDE PATH
A
C
331A-4A COURSE INDICATOR
N
W
E
S
A
B
C

Localizer and Glide Slope Operation, Pictorial Diagram
Figure 8



Sine Wave Phase Comparison, Simplified Diagram
Figure 9

(b) VOR Radiation Pattern.

An understanding of the VOR ground radio system and radiation pattern will aid in understanding the operation of the 51RV-1 VOR circuits. The principle of VOR navigation is phase comparison of two audio signals. The VOR receiver and instrumentation units of the 51RV-1 receive, detect, and compare the phases of two audio signals which are modulated on the VOR r-f carrier. The signals compared are two 30-cps audio signals.

The VOR r-f carrier is radiated from a ground system employing two antennas. A constant-phase, 30-cps audio signal is radiated omnidirectional from one antenna by a subcarrier modulation system. The second antenna is a dipole which is turned at 1800 rpm. The field radiated by this antenna varies at a 30-cps rate. This 30 cps varies in phase which is dependent on the bearing from the VOR station. Thus the phase difference of the two 30-cps signals is equal to the bearing from the VOR station.

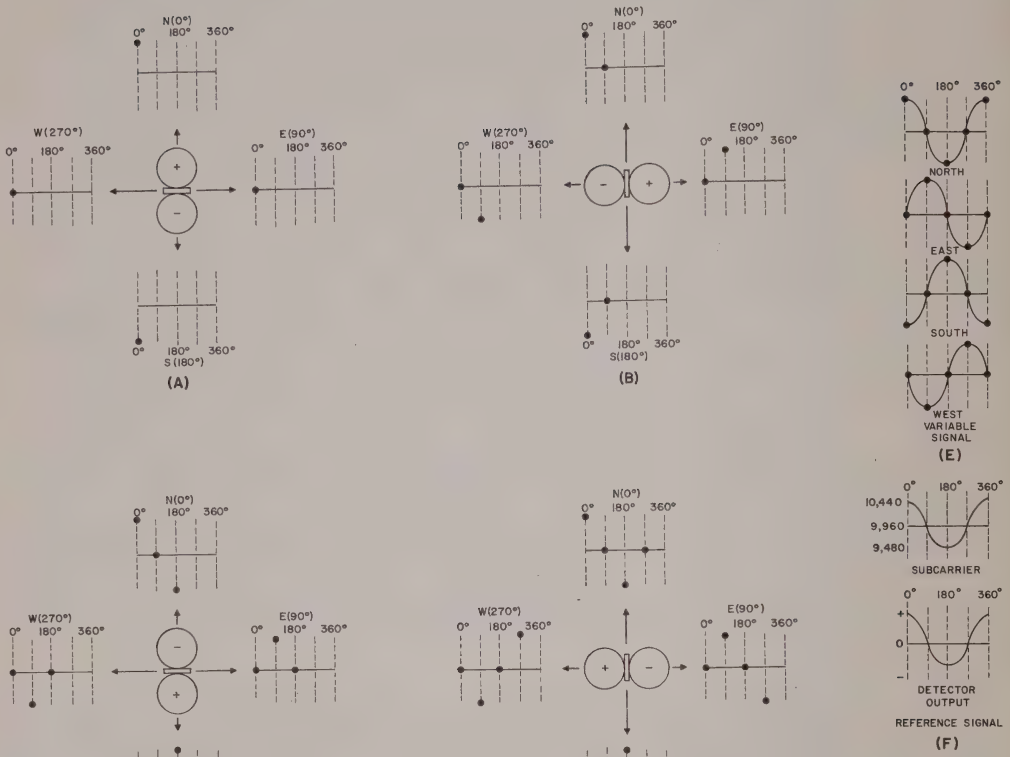
The 30-cps signal which varies in phase amplitude modulates the r-f carrier. The 30-cps signal with the constant phase is frequency modulated on a subcarrier, which in turn amplitude modulates the r-f carrier. The purpose of the subcarrier modulation is to provide a means of discriminating between the two 30-cps signals at the receiver.

The 30-cps signal, which varies in phase, is called the variable 30-cps signal and is obtained by transferring the r-f carrier to a dipole antenna and rotating the antenna at 1800 rpm's (30 rps). Refer to figure 10. The radiation field of a dipole antenna is a figure eight, with the lobes 180 degrees out of phase; therefore the field strengths at four directions (90 degree locations) from the antenna will be as shown by the black dots in figure 10(A) for one position of the dipole antenna. The relative strengths of the radiated r-f field are shown for this position, indicating maximum strength at zero degree (north), minimum strength at 180 degrees (south), and an average strength (on reference line) at 90 and 270 degrees (east and west). The dots indicating field strength are placed on a graph depicting time versus signal strength. Vertical lines are added along the time axis to illustrate time for 1/4 cycle (90 degrees). Figure 10(B) illustrates the field strengths with the dipole antenna rotated clockwise 90 degrees from the position shown in figure 10(A) (1/4 turn). Relative strengths at the north and south locations are now average and are shown on the graph at a time 90 degrees later. Maximum signal strength is plotted at 90 degrees (east) and minimum signal strength is plotted at 270 degrees (west). The field strengths are plotted in figure 10(C) for the pattern of the dipole antenna rotated another 90 degrees (180 degrees from the position shown in figure 10(A)). The average signal strengths are plotted on the reference line at 90 and 270 degrees (at a time 180 degrees later), maximum positive signal strength is plotted at 180 degrees (south), and maximum negative signal strength is plotted at zero degree (north). The field strengths plotted in figure 10(D) are shown for the antenna rotated another 90 degrees (270 degrees from the original position in figure 10(A). When the antenna has been rotated 360 degrees, the signal strengths will be the same as those shown in figure 10(A), and advanced 360 degrees along the time axis. Figure 10(E) illustrates the voltage waveform of the signal strength plots at each direction from the station.

Since the dipole antenna is turned at a speed of 30 rps (1800 rpm), these signal strengths will vary at a 30-cps rate, and effectively amplitude modulate the VOR carrier. Note that the 30-cps signal at the location 90 degrees from the VOR station lags the signal at the zero-degree location by 90 degrees. The phase of the signal continues to lag the signal north of the station by the number of degrees equal to the bearing from the station.

The phasing of the reference and variable signals is adjusted so they are in phase at magnetic north. The frequency of the subcarrier is synchronized with the rotation of the dipole antenna. When the frequency of the subcarrier is 10,440 cps, the positive lobe of the dipole antenna is pointed toward magnetic north. The subcarrier frequency decreases to 9480 cps as the dipole antenna rotates clockwise 180 degrees. At 90 and 270 degrees from north (zero degree) the subcarrier frequency is 9960 cps. The subcarrier is varying between 9480 and 10,440 cps at a 30-cps rate. A maximum positive audio modulating voltage produces 10,440 cps and a maximum negative voltage produces 9480 cps. Thus the output of an FM detector will be positive when the frequency is 10,440 cps and negative when the frequency is 9480 cps. The frequency of this voltage will be equal to the rate the subcarrier frequency is varying, which is 30 cps.

The subcarrier frequency and the output voltage from an FM discriminator is shown in figure 10(F) for one cycle (one revolution of dipole antenna).


N(0°)
W(270°)
E(90°)
S(180°)
0°
180°
360°
(A)
(B)
(C)
(D)
NORTH
EAST
SOUTH
WEST
VARIABLE SIGNAL
(E)
10,440
9,960
9,480
SUBCARRIER
+
0
-
DETECTOR OUTPUT
REFERENCE SIGNAL
(F)

VOR Radiation Patterns, Simplified Diagram
Figure 10

(c) VOR Operation.

1. General.

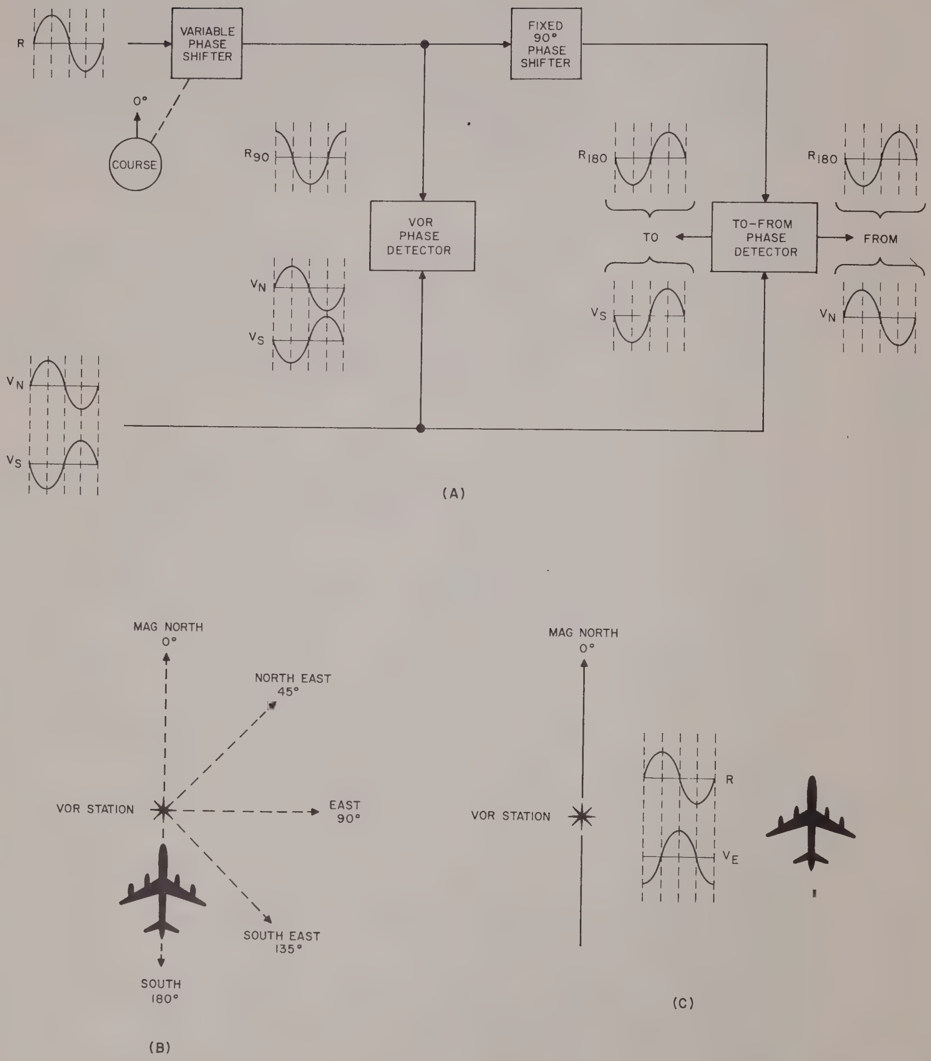
It is illustrated in the preceding paragraph that the phase angle between the reference and variable signals is a measure of the bearing of the aircraft from the VOR station. The 51RV-1 VOR instrumentation circuitry measures this phase angle by providing a means to shift the reference signal after it has been demodulated from the 9960 subcarrier.

If it were practical to determine when two signals were in phase, the phase angle could be determined by shifting the reference signal until it was exactly in phase with the variable signal. Then the amount the reference signal was shifted would be a measure of the bearing from the station and could be indicated on any scale or dial coupled to the phase-shifting device. Since it is much simpler to determine when two signals are 90 degrees out of phase, the reference signal is shifted an amount equal to the variable signal plus 90 degrees. The scale or dial is coupled to the phase-shifting device in such a manner that the extra 90 degrees of phase shift is not indicated.

2. Manual VOR Operation.

Manual VOR operation is the term given when the reference signal is shifted manually to measure the phase angle between the detected reference and variable signals. The phase difference between the reference and variable signals is detected in a phase detector. When the signals are 90 degrees out of phase, the comparator applied a d-c voltage to the course indicator which centers the deviation needle. The deviation needle will deflect to the right or left if the aircraft is off the selected course.

Figure 11(A) illustrates the detector input variable and reference signals and the instrumentation circuits which provide outputs for the deviation and to-from indicators. The input reference (R) and variable (V north and south) signals are shown as applied to the instrumentation circuits. The reference (R) signal is coupled through a variable phase shifter where the phase of the signal may be varied by turning the indicator course knob. The course knob drives a course arrow to a direction read in degrees. When the reading is zero degree, the reference signal is shifted ahead 90 degrees in the variable phase shifter. This shifted reference signal and the variable signal are applied to the VOR phase detector and are 90 degrees out of phase when the aircraft is north or south of the VOR station. This quadrature relationship provides an output to center the deviation needle, which then will be centered when the aircraft is north or south of the VOR station. To resolve this ambiguity, a to-from phase detector is employed to operate a to-from indicator. The reference signal is shifted ahead another 90 degrees and compared with the variable signal in the to-from phase detector. The phase difference of the signals will be either 180 degrees or zero degree when they are 90 degrees out of phase in the VOR phase detector (aircraft on course). When the signals are in phase, the detector will provide an output to obtain a TO indication, and a 180-degree out-of-phase relationship will provide an output to obtain a FROM indication. Figure 11(A) illustrates that variable signal VS and the reference signal R, when received south of the station, are in phase in the to-from phase detector. The phase detector output will drive the to-from indicator to a TO indication. Figure 11(B) shows the VOR station and the zero-degree radial. If the aircraft is south of the station, a VOR course of zero degree will take it TO the station. Conversely, a VOR course of 180 degrees will take it FROM the station. If the pilot selects the 180-degree course, he will turn the course selector knob, and shift the reference signal R 180 degrees in the variable phase shifter, figure 11(A). The quadrature phase relationship still exists in the VOR phase detector, but the signals in the to-from phase detector will now be 180 degrees out of phase. The phase detector output will drive the to-from


R
VARIABLE PHASE SHIFTER
0°
COURSE
FIXED 90° PHASE SHIFTER
R90
VOR PHASE DETECTOR
VN
VS
R180
TO
TO-FROM PHASE DETECTOR
FROM
R180
VS
VN
VN
VS
(A)
MAG NORTH 0°
NORTH EAST 45°
VOR STATION
EAST 90°
SOUTH EAST 135°
SOUTH 180°
(B)
MAG NORTH 0°
VOR STATION
R
VE
(C)

VOR Operation, Simplified Diagram
Figure 11

indicator to a FROM indication, showing that the 180-degree course will take the aircraft FROM the station. If the aircraft is located east of the station, with a VOR course of zero degree selected, the received variable signal will lag the reference signal by 90 degrees. See figure 11(C). The reference signal is shifted ahead 90 degrees in the phase shifter and will now be 180 degrees out of phase with the variable signal in the VOR phase detector. The phase detector output will deflect the deviation needle to the left. The deviation needle pictorially represents the VOR course, therefore when the needle has deflected to the left, the VOR course is to the left of the aircraft. The pilot has to fly the aircraft to the left to approach the VOR course.

3. Automatic VOR Operation.

Automatic VOR operation is the term given when the reference signal is shifted automatically to measure the phase angle between the variable and reference 30 cps. The phase difference between the reference and variable signals is detected in a phase detector. The phase detector output is converted to a-c and amplified to drive a bearing mechanism motor. The motor turns the variable phase shifter and a synchro which drives an RMI pointer. The motor will turn until it has shifted the reference signal in the phase shifter to obtain a 90-degree phase relationship with the variable signal in the VOR phase detector. At this time the phase detector output will be zero and the motor will stop, positioning the RMI pointer at the bearing to the VOR station. A continuous reading of the bearing to the station will be read on the RMI.

C. 51RV-1 Block Diagram Theory.

(1) 51V-4B Glide Slope Receiver Block Diagram Theory.

The 51V-4B is a completely solid-state, 20-channel, dual-conversion receiver. (Refer to figure 13.) The two-out-of-five binary switching selects first oscillator, Q1, crystals. A regulated power supply provides constant voltage for all stages.

The r-f input from the glide slope antenna is coupled through a band-pass filter to first mixer CR14. First oscillator Q1 output frequency is coupled through tripler Q14 and injection amplifier Q15 to the first mixer. The difference frequency is selected in the mixer output and coupled through 30-mc amplifier Q2 and filter FL1 to second oscillator-mixer Q3. The 30-mc signal is mixed with the oscillator frequency of 26.9 megacycles. The difference frequency is selected and coupled through 3.1-mc filter FL2 to the first 3.1-megacycle i-f amplifier, Q4.

The i-f signal is transformer coupled through three stages of amplification, Q4-Q6, to detector CR15. The detector output is applied to transistor Q7 which acts as an emitter-follower for audio signals and as a d-c amplifier for the agc voltage. The agc output is coupled to second agc amplifier Q8, and the audio output is coupled to first audio amplifier Q9. Agc voltage output of the second agc amplifier is applied to 30-mc i-f amplifier Q2 and to the first two 3.1-mc i-f amplifiers, Q4 and Q5. A portion of the agc voltage is also applied to first audio amplifier Q9 through a course-softening potentiometer which provides reduced deflection sensitivity when the aircraft nears the runway. The output from first audio amplifier Q9 is transformer coupled to a push-pull audio amplifier, Q10 and Q11. The audio amplifier output, consisting of the 90- and 150-cps glide slope signals, is rectified, separated, and fed to the glide slope deviation needle and flag alarm of the course indicator.

(2) 51X-4 VOR/LOC Receiver Block Diagram Theory.

The 51X-4, block diagram shown in figure 13, is a completely solid-state, 200-channel, triple-conversion receiver. The two-out-of-five binary switching selects the crystals for the three oscillators, and tunes the r-f amplifier input and output circuits for each megacycle of the frequency range. A regulated power supply provides constant voltage for all stages.

The r-f input from the VOR/LOC antenna is coupled through three tuned circuits to r-f amplifier Q1. The r-f amplifier output is coupled through a tuned interstage circuit to first mixer Q2 where it is mixed with the amplified output of vhf oscillator Q4. The difference frequency is selected and coupled through a 22-mc filter FL1 to second mixer Q10 where it is mixed with the output of 10-channel h-f oscillator Q5. A 4.6-mc filter, FL2, in the output of the second mixer couples the difference frequency to third mixer Q11. An output from the 2-channel h-f oscillator, Q6, is also coupled to the third mixer. The difference frequency in the third mixer is coupled through 500-kc filter FL3 to first 500-kc i-f amplifier Q12.

The i-f signal is transformer coupled through four stages of amplification Q12-Q15 to detector CR62. The detector output is applied to agc amplifier Q18, noise limiter CR64, and the VOR/LOC output terminals.

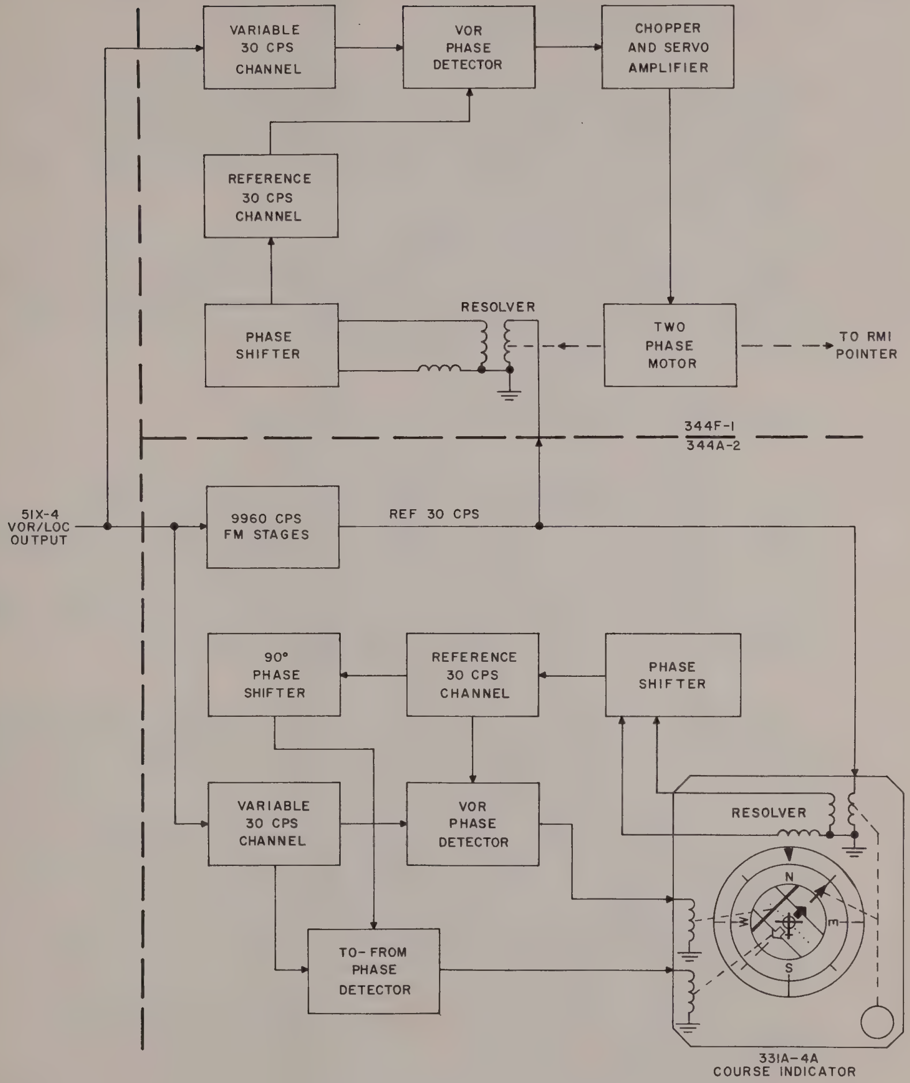
The output of the agc amplifier is applied to r-f amplifier Q1 and the first two 500-kc i-f amplifier stages, Q12 and Q13. The noise limiter output is coupled through four amplifiers Q16, Q17, Q19, and Q20 to the receiver aural output terminals. This aural output, when applied to the aircraft headphones, enables the pilot to listen to information transmitted by voice on the VOR/LOC carrier. The VOR/LOC audio frequencies are fed to the VOR/LOC output terminals. These frequencies, 90, 150, 30, and 9960 cps, are attenuated by a filter in the aural amplifier stages.

(3) Instrumentation Units Block Diagram Theory.

(a) General.

The purpose of each instrumentation unit is to determine the amount of phase difference between the radiated reference and variable 30-cps signals after they are detected. The two signals are coupled from the 51X-4 VOR/LOC output through two separate channels in each instrumentation unit to a phase detector where the phase difference is detected. The reference 30 cps is coupled through a phase shifter where the phase of the 30 cps can be varied by turning a resolver rotor. Each of the 51RV-1 instrumentation units employs a different means to turn the resolver rotor. Refer to figure 12.

The resolver for the 344A-2 reference 30-cps channel is located in the course indicator and the rotor is ganged to the COURSE knob. When the pilot selects a course, he shifts the phase of the reference 30 cps. The 344A-2 instrumentation


VARIABLE 30 CPS CHANNEL
VOR PHASE DETECTOR
CHOPPER AND SERVO AMPLIFIER
REFERENCE 30 CPS CHANNEL
PHASE SHIFTER
RESOLVER
TWO PHASE MOTOR
TO RMI POINTER
344F-1
344A-2
51X-4 VOR/LOC OUTPUT
9960 CPS FM STAGES
REF 30 CPS
90° PHASE SHIFTER
REFERENCE 30 CPS CHANNEL
PHASE SHIFTER
VARIABLE 30 CPS CHANNEL
VOR PHASE DETECTOR
RESOLVER
TO- FROM PHASE DETECTOR
N
W
E
S
331A-4A COURSE INDICATOR

VOR Operation, Simplified Diagram
Figure 12

circuits detect this phase shift and provide outputs for the course indicator deviation needle, flag alarm, and to-from indicator. The deviation needle is centered when the aircraft is on the course selected.

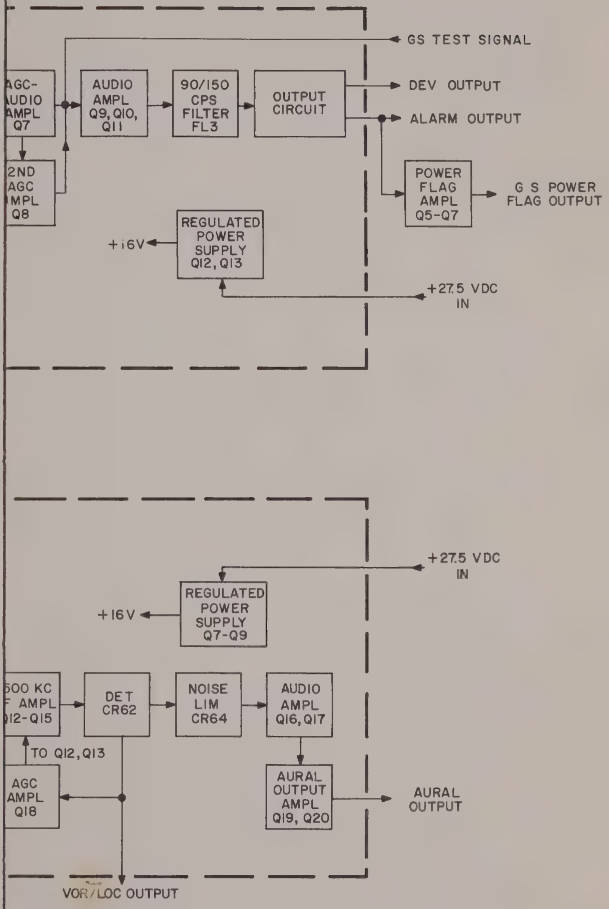
The resolver rotor in the 344F-1 is turned by a two-phase motor, within the unit, which is driven by the phase detector output. This two-phase motor also turns a synchro differential which provides an output to drive the RMI needle. When the RMI needle indicates the bearing to the station, the 344F-1 phase detector output is zero and the two-phase motor stops. An automatic, continuous reading of the bearing to the station is thus provided.

The accuracy of both instrumentation units is checked when the VOR test control is activated. A test 30-cps signal is then fed through the variable signal channels in each unit. The 344A-2 output provides a FROM indication and centers the deviation needle when the course knob is set to select a zero-degree course. The 344F-1 output drives the RMI needle to 180 degrees.

(b) 344A-2 Block Diagram Theory. (Refer to figure 13.)

When the 51RV-1 is tuned to a VOR frequency, localizer switch CR11 is biased to cut off amplifier Q9. When the 51RV-1 is tuned to a localizer frequency in the 108.10- to 111.90-mc (odd tenths megacycles) frequency range, localizer switch CR11 is biased to allow amplifier Q9 to raise the level of the 90- to 150-cps signals from the 51X-4 VOR/LOC output and couple these signals through output amplifiers Q10 and Q11 to the localizer output circuitry. The output circuitry detects the amplitude difference of the 90- and 150-cps signals and applies an output to the deviation and flag alarm of the course indicator.

The variable 30-cps VOR signal in the 51X-4 VOR/LOC output is coupled to the variable channel low-pass filter when the 51RV-1 is tuned to a VOR frequency. The low-pass filter attenuates the 9960-cps subcarrier and couples the variable 30 cps to the variable 30-cps amplifier, Q19 through Q25. The propeller modulation filter between amplifiers Q20 and Q21 attenuates harmonics of the 30-cps signal. The amplifier output is coupled to the VOR and to-from phase detector. The 9960 cps which is the subcarrier for the reference 30 cps, is coupled from the 51X-4 VOR/LOC output through 9960-cps amplifiers Q1 and Q2 and limiters CR1, CR2, CR3, and CR4. The amplified square-wave output of the amplifiers and limiters is coupled to the FM detector where the reference 30-cps envelope is demodulated from the 9960-cps subcarrier. Reference 30-cps detector CR5 and CR6 detect the 30 cps which is applied to drivers Q4 and Q5. The output of automatic resolver driver Q5 is coupled to resolver B2 in the 344F-1, and the output of manual resolver driver Q4 is coupled to the OBS resolver in the course indicator. The OBS resolver and an RC network in the 344A-2 form a phase shifter. The shifted reference 30 cps is coupled from the phase shifter to the low-pass filter in the reference channel. The stages following the low-pass filter are identical to the stages following the low-pass filter in the variable channel. The reference 30 cps is coupled to the VOR phase detector and through a fixed 90-degree phase shifter to the to-from phase detector. The VOR phase detector output is fed to the deviation needle and flag alarm on the course indicator. The phase difference of the reference and variable signals is also detected in


GS TEST SIGNAL
AGC-
UDIO
AMPL
Q7
AUDIO
AMPL
Q9, Q10,
Q11
90/150
CPS
FILTER
FL3
OUTPUT
CIRCUIT
DEV OUTPUT
ALARM OUTPUT
2ND
AGC
MPL
Q8
POWER
FLAG
AMPL
Q5-Q7
G S POWER
FLAG OUTPUT
+16V
REGULATED
POWER
SUPPLY
Q12, Q13
+27.5 VDC
IN
+27.5 VDC
IN
+16V
REGULATED
POWER
SUPPLY
Q7-Q9
500 KC
F AMPL
Q12-Q15
DET
CR62
NOISE
LIM
CR64
AUDIO
AMPL
Q16, Q17
TO Q12, Q13
AGC
AMPL
Q18
AURAL
OUTPUT
AMPL
Q19, Q20
AURAL
OUTPUT
VOR/LOC OUTPUT

51RV-1 VOR/ILS Receiver, Block
Diagram (Sheet 1 of 2)
Figure 13

circuits detect this phase shift and provide outputs for the course indicator deviation needle, flag alarm, and to-from indicator. The deviation needle is centered when the aircraft is on the course selected.

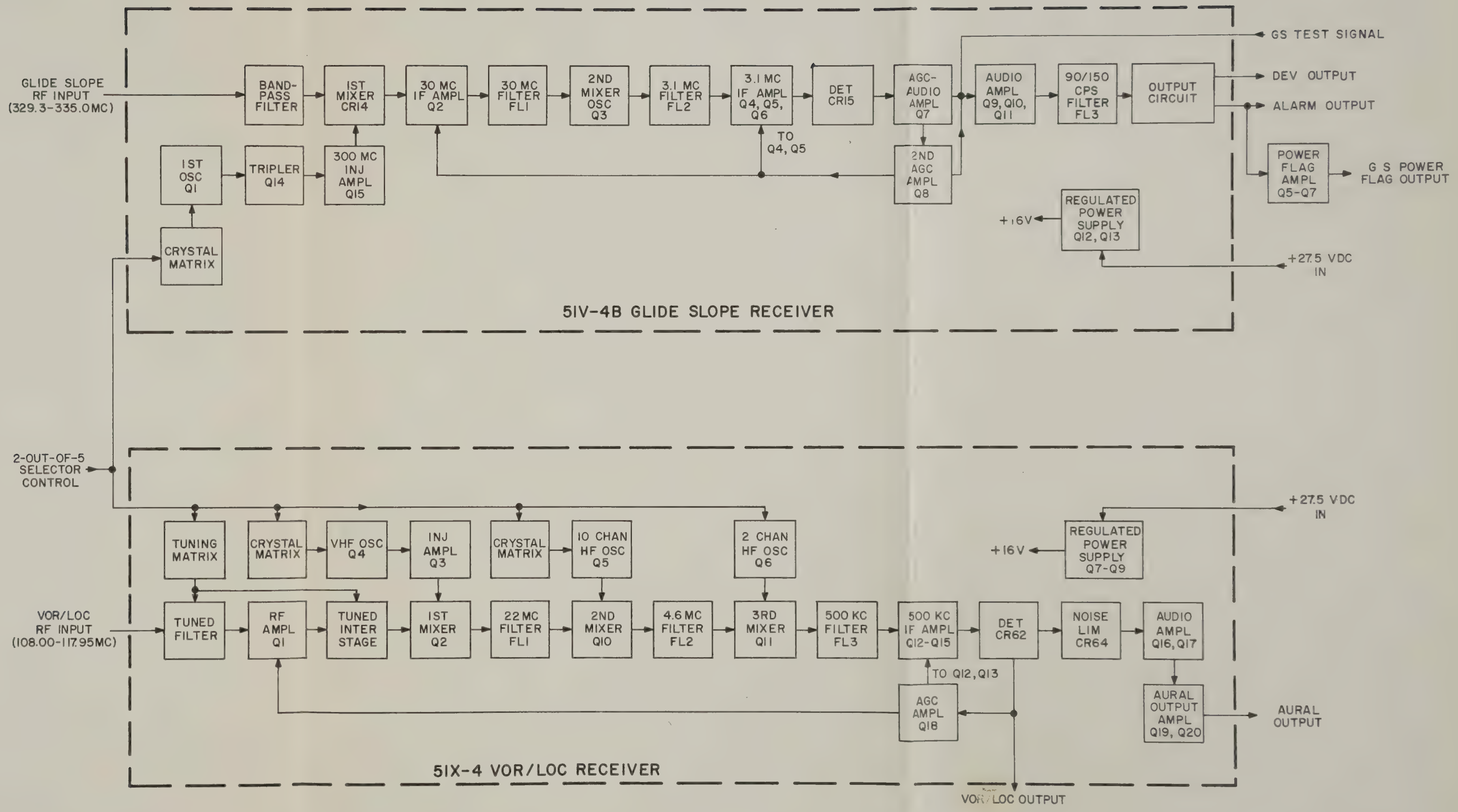
The resolver rotor in the 344F-1 is turned by a two-phase motor, within the unit, which is driven by the phase detector output. This two-phase motor also turns a synchro differential which provides an output to drive the RMI needle. When the RMI needle indicates the bearing to the station, the 344F-1 phase detector output is zero and the two-phase motor stops. An automatic, continuous reading of the bearing to the station is thus provided.

The accuracy of both instrumentation units is checked when the VOR test control is activated. A test 30-cps signal is then fed through the variable signal channels in each unit. The 344A-2 output provides a FROM indication and centers the deviation needle when the course knob is set to select a zero-degree course. The 344F-1 output drives the RMI needle to 180 degrees.

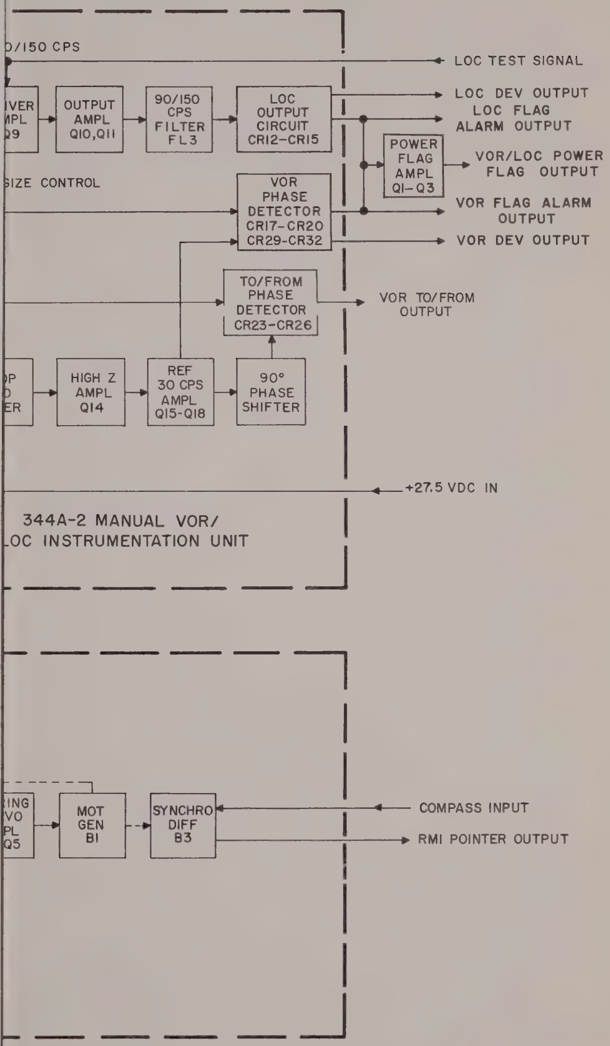
(b) 344A-2 Block Diagram Theory. (Refer to figure 13.)

When the 51RV-1 is tuned to a VOR frequency, localizer switch CR11 is biased to cut off amplifier Q9. When the 51RV-1 is tuned to a localizer frequency in the 108.10- to 111.90-mc (odd tenths megacycles) frequency range, localizer switch CR11 is biased to allow amplifier Q9 to raise the level of the 90- to 150-cps signals from the 51X-4 VOR/LOC output and couple these signals through output amplifiers Q10 and Q11 to the localizer output circuitry. The output circuitry detects the amplitude difference of the 90- and 150-cps signals and applies an output to the deviation and flag alarm of the course indicator.

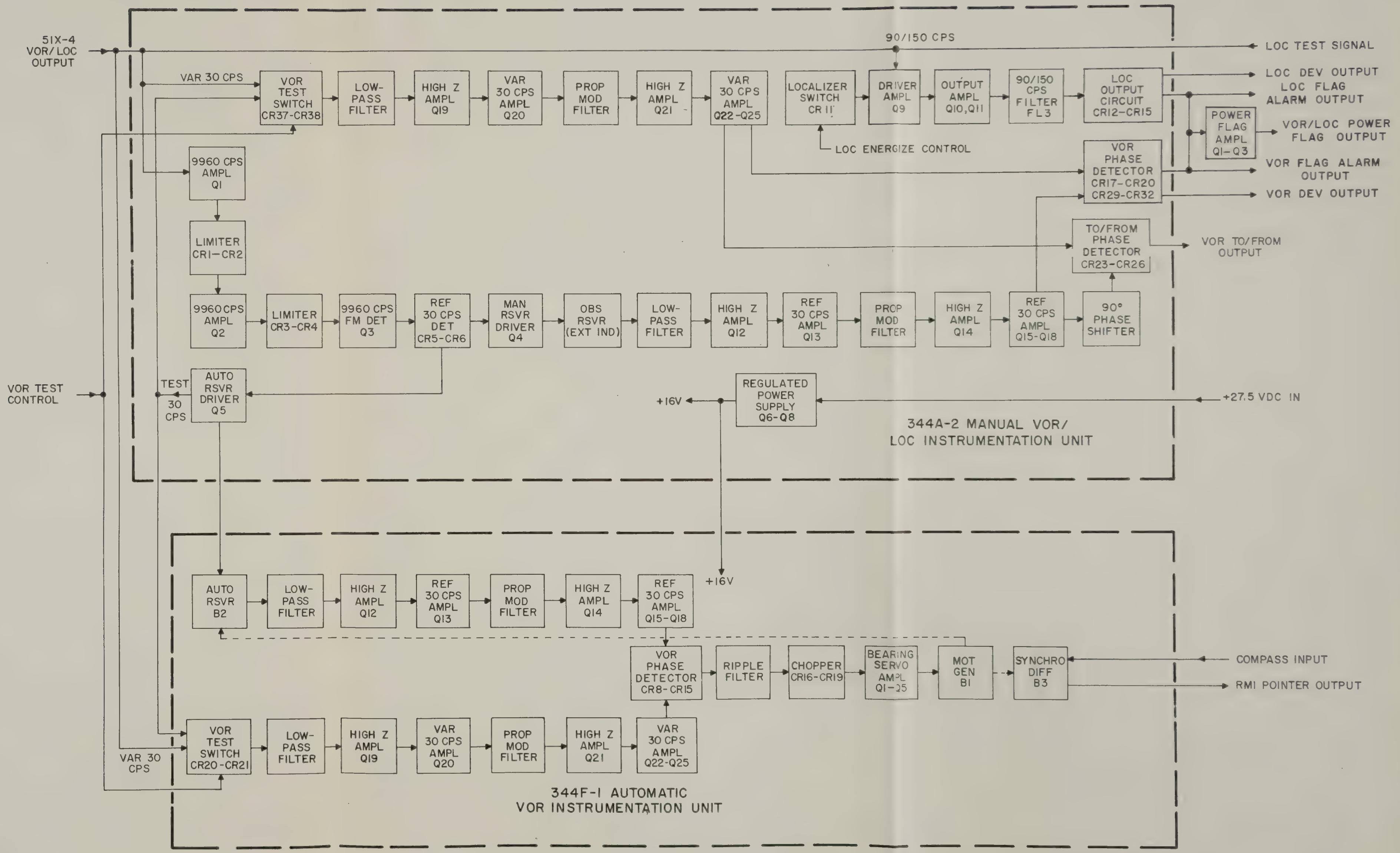
The variable 30-cps VOR signal in the 51X-4 VOR/LOC output is coupled to the variable channel low-pass filter when the 51RV-1 is tuned to a VOR frequency. The low-pass filter attenuates the 9960-cps subcarrier and couples the variable 30 cps to the variable 30-cps amplifier, Q19 through Q25. The propeller modulation filter between amplifiers Q20 and Q21 attenuates harmonics of the 30-cps signal. The amplifier output is coupled to the VOR and to-from phase detector. The 9960 cps which is the subcarrier for the reference 30 cps, is coupled from the 51X-4 VOR/LOC output through 9960-cps amplifiers Q1 and Q2 and limiters CR1, CR2, CR3, and CR4. The amplified square-wave output of the amplifiers and limiters is coupled to the FM detector where the reference 30-cps envelope is demodulated from the 9960-cps subcarrier. Reference 30-cps detector CR5 and CR6 detect the 30 cps which is applied to drivers Q4 and Q5. The output of automatic resolver driver Q5 is coupled to resolver B2 in the 344F-1, and the output of manual resolver driver Q4 is coupled to the OBS resolver in the course indicator. The OBS resolver and an RC network in the 344A-2 form a phase shifter. The shifted reference 30 cps is coupled from the phase shifter to the low-pass filter in the reference channel. The stages following the low-pass filter are identical to the stages following the low-pass filter in the variable channel. The reference 30 cps is coupled to the VOR phase detector and through a fixed 90-degree phase shifter to the to-from phase detector. The VOR phase detector output is fed to the deviation needle and flag alarm on the course indicator. The phase difference of the reference and variable signals is also detected in


GLIDE SLOPE RF INPUT (329.3-335.0MC)
BAND-PASS FILTER
IST MIXER CR14
30 MC IF AMPL Q2
30 MC FILTER FL1
2ND MIXER OSC Q3
3.1 MC FILTER FL2
3.1 MC IF AMPL Q4, Q5, Q6
DET CR15
AGC-AUDIO AMPL Q7
AUDIO AMPL Q9, Q10, Q11
90/150 CPS FILTER FL3
OUTPUT CIRCUIT
GS TEST SIGNAL
DEV OUTPUT
ALARM OUTPUT
TO Q4, Q5
2ND AGC AMPL Q8
IST OSC Q1
TRIPLER Q14
300 MC INJ AMPL Q15
CRYSTAL MATRIX
POWER FLAG AMPL Q5-Q7
G S POWER FLAG OUTPUT
+16V
REGULATED POWER SUPPLY Q12, Q13
+27.5 VDC IN
5IV-4B GLIDE SLOPE RECEIVER
2-OUT-OF-5 SELECTOR CONTROL
+27.5 VDC IN
TUNING MATRIX
CRYSTAL MATRIX
VHF OSC Q4
INJ AMPL Q3
CRYSTAL MATRIX
10 CHAN HF OSC Q5
2 CHAN HF OSC Q6
+16V
REGULATED POWER SUPPLY Q7-Q9
VOR/LOC RF INPUT (108.00-117.95MC)
TUNED FILTER
RF AMPL Q1
TUNED INTER STAGE
IST MIXER Q2
22 MC FILTER FL1
2ND MIXER Q10
4.6 MC FILTER FL2
3RD MIXER Q11
500 KC FILTER FL3
500 KC IF AMPL Q12-Q15
DET CR62
NOISE LIM CR64
AUDIO AMPL Q16, Q17
TO Q12, Q13
AGC AMPL Q18
AURAL OUTPUT AMPL Q19, Q20
AURAL OUTPUT
5IX-4 VOR/LOC RECEIVER
VOR/LOC OUTPUT

51RV-1 VOR/ILS Receiver, Block Diagram (Sheet 1 of 2)
Figure 13


0/150 CPS
LOC TEST SIGNAL
IVER
MPL
Q9
OUTPUT AMPL Q10,Q11
90/150 CPS FILTER FL3
LOC OUTPUT CIRCUIT CR12-CR15
LOC DEV OUTPUT
LOC FLAG ALARM OUTPUT
POWER FLAG AMPL Q1-Q3
VOR/LOC POWER FLAG OUTPUT
SIZE CONTROL
VOR PHASE DETECTOR CR17-CR20 CR29-CR32
VOR FLAG ALARM OUTPUT
VOR DEV OUTPUT
TO/FROM PHASE DETECTOR CR23-CR26
VOR TO/FROM OUTPUT
OP
D
ER
HIGH Z AMPL Q14
REF 30 CPS AMPL Q15-Q18
90° PHASE SHIFTER
+27.5 VDC IN
344A-2 MANUAL VOR/
LOC INSTRUMENTATION UNIT
ING
VO
PL
Q5
MOT GEN B1
SYNCHRO DIFF B3
COMPASS INPUT
RMI POINTER OUTPUT

51RV-1 VOR/ILS Receiver, Block Diagram (Sheet 2 of 2)
Figure 13


51X-4 VOR/LOC OUTPUT
90/150 CPS
LOC TEST SIGNAL
VAR 30 CPS
VOR TEST SWITCH CR37-CR38
LOW-PASS FILTER
HIGH Z AMPL Q19
VAR 30 CPS AMPL Q20
PROP MOD FILTER
HIGH Z AMPL Q21
VAR 30 CPS AMPL Q22-Q25
LOCALIZER SWITCH CR 11
DRIVER AMPL Q9
OUTPUT AMPL Q10,Q11
90/150 CPS FILTER FL3
LOC OUTPUT CIRCUIT CR12-CR15
LOC DEV OUTPUT
LOC FLAG ALARM OUTPUT
POWER FLAG AMPL Q1-Q3
VOR/LOC POWER FLAG OUTPUT
LOC ENERGIZE CONTROL
VOR PHASE DETECTOR CR17-CR20 CR29-CR32
VOR FLAG ALARM OUTPUT
VOR DEV OUTPUT
9960 CPS AMPL Q1
LIMITER CR1-CR2
TO/FROM PHASE DETECTOR CR23-CR26
VOR TO/FROM OUTPUT
9960 CPS AMPL Q2
LIMITER CR3-CR4
9960 CPS FM DET Q3
REF 30 CPS DET CR5-CR6
MAN RSVR DRIVER Q4
OBS RSVR (EXT IND)
LOW-PASS FILTER
HIGH Z AMPL Q12
REF 30 CPS AMPL Q13
PROP MOD FILTER
HIGH Z AMPL Q14
REF 30 CPS AMPL Q15-Q18
90° PHASE SHIFTER
VOR TEST CONTROL
TEST
30 CPS
AUTO RSVR DRIVER Q5
+16V
REGULATED POWER SUPPLY Q6-Q8
+27.5 VDC IN
344A-2 MANUAL VOR/ LOC INSTRUMENTATION UNIT
AUTO RSVR B2
LOW-PASS FILTER
HIGH Z AMPL Q12
REF 30 CPS AMPL Q13
PROP MOD FILTER
HIGH Z AMPL Q14
REF 30 CPS AMPL Q15-Q18
+16V
VOR PHASE DETECTOR CR8-CR15
RIPPLE FILTER
CHOPPER CR16-CR19
BEARING SERVO AMPL Q1-Q5
MOT GEN B1
SYNCHRO DIFF B3
COMPASS INPUT
RMI POINTER OUTPUT
VAR 30 CPS
VOR TEST SWITCH CR20-CR21
LOW-PASS FILTER
HIGH Z AMPL Q19
VAR 30 CPS AMPL Q20
PROP MOD FILTER
HIGH Z AMPL Q21
VAR 30 CPS AMPL Q22-Q25
344F-1 AUTOMATIC VOR INSTRUMENTATION UNIT

51RV-1 VOR/ILS Receiver, Block Diagram (Sheet 2 of 2)
Figure 13

the to-from phase detector after the reference signal is shifted 90 degrees. This phase detector applied an output to the course indicator to-from indicator.

The power supply (Q6-Q8) provides a regulated +16 volts d-c for all stages in the 344A-2 and 344F-1.

(c) 344F-1 Block Diagram Theory. Refer to figure 13.

The 344A-2 automatic resolver driver Q5 reference 30 cps output is fed to a resolver B2 in the 344F-1 bearing mechanism module. The resolver and an RC network form a phase shifter. The reference 30 cps is then coupled from the phase shifter (resolver stators) through the reference 30 cps channel to the VOR phase detector. The variable 30 cps output of the 51X-4 is coupled through the variable 30 cps channel to the VOR phase detector. The stages in these two channels are identical to the stages in the reference and variable channels in the 344A-2. The variable and reference signals are compared in the VOR phase detector. The phase detector d-c output is filtered and converted to an a-c voltage which is amplified to drive a two phase motor. This motor drives the phase shifter resolver rotor until the reference 30 cps signal is in quadrature with the variable 30 cps. The phase detector output will then be zero and the motor will stop. The motor drives a differential synchro which transmits a voltage to the RMI synchro to drive the needle to a position which indicates the magnetic bearing to the station.

(4) ILS Self-Test (if installed).

The ILS self-test circuitry consists of stable, phase-locked, 90- and 150-cps audio oscillators and a 450-cps master oscillator. The 90- and 150-cps outputs are combined in suitable ratios and injected into the first audio stages of the localizer and glide slope receivers. The voltage regulator circuit consisting of transistors Q7 and Q8 and Zener diodes CR27 and CR28 supplies 16.5 volts d-c to the oscillators. The circuit can be actuated by either of two pushbuttons on the 51RV-1 front panel or by a toggle switch on the cockpit control panel. When the UP/LEFT switch is actuated, a signal is fed into the ILS receiver circuitry to move the glide slope pointer up, the deviation pointer to the left, and the G. S. and VOR/LOC flags out of sight. The DOWN/RIGHT switch feeds a signal into the ILS circuitry that moves the glide slope pointer down, the deviation pointer to the right, and the G. S. and VOR/LOC flags out of sight.

(5) 51RV-1 T-Frame.

The 51RV-1 frame, schematic shown in figure 819, provides a support for the units described in paragraphs (1), (2), and (3). All units may be adjusted and serviced while they are connected to the frame and operating. The frame includes the necessary cabling circuitry for glide slope/localizer switching, additional flag, deviation, and to-from indicator loads, meter damping capacitors, and power flag units. The power flag units provide an amplified flag alarm output to operate a master warning system. Jumper wires may be connected on the mount connector to add flag and deviation loads from the frame without disturbing any circuitry in the 51RV-1. Figure 14 lists the connectors that are located on the 51RV-1 frame and their functions.

51RV-1 FRAME CONNECTOR	FUNCTION	UNIT MATING CONNECTOR
DPA-24W2-33S-1	Interconnect for the 51V-4B	DPA-24W2-34P-1
DBM-21W1S	Interconnect for the 51X-4	DPM-21W1P
DPA-32-33S-3 (A101)	Interconnect for the 344A-2	DPA-32-34P-3 (A101)
DB-25S-C7	Interconnect for the 344F-1	DB-25P-C7
DPX2CA-32W2P57P-34B	51RV-1 main interconnect	DP2CA-32W2P57S-33B

Table of 51RV-1 Connectors
Figure 14

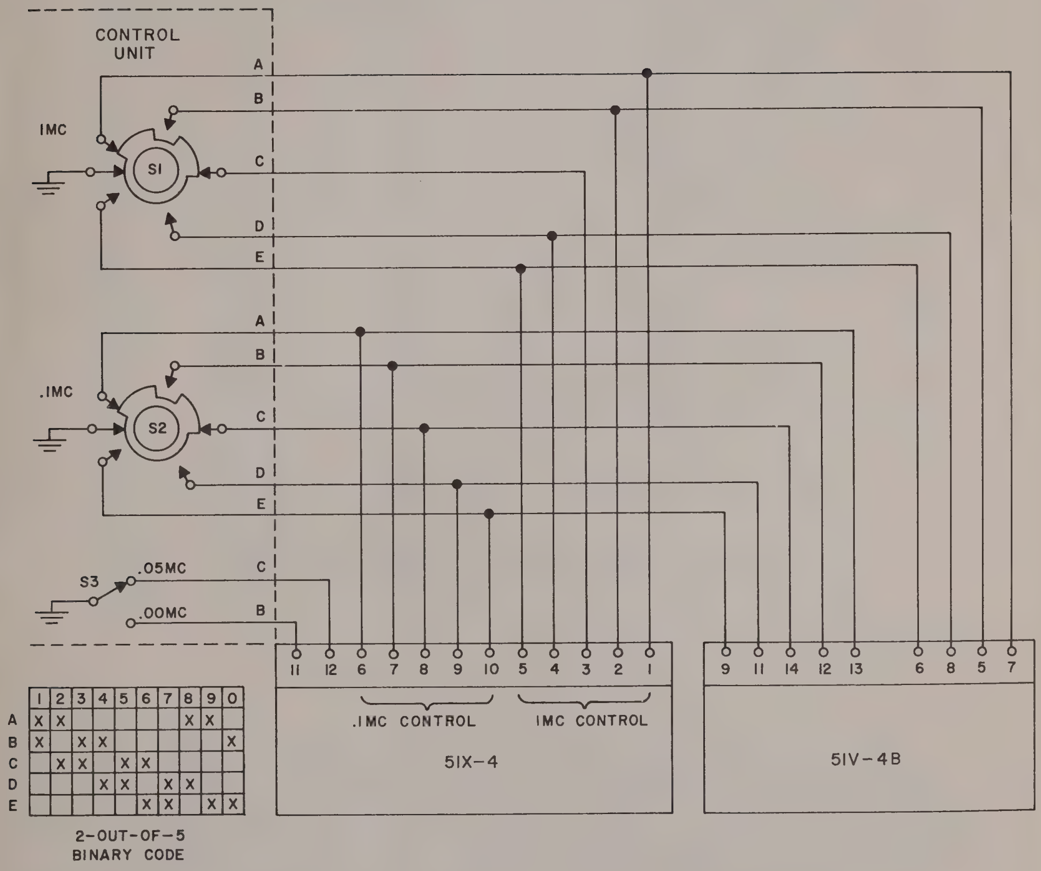
D. Two-out-of-Five Frequency Scheme.

The frequency selection scheme in the 51RV-1 uses a two-out-of-five control system employing five wires per decade. Ten positions of a switch are used to ground two of five wires to provide 10 different combinations. Frequency control switching is completely solid state in the 51RV-1.

The frequency control scheme for the 51RV-1 consists of two five-wire-per-decade systems. It is shown in figure 15 along with the two-out-of-five binary code. Each decade system is controlled by a 10-position switch in a control unit. Each switch position places a ground on two of five control wires. One switch selects a voltage divider and a crystal for megacycle operation and the other switch selects crystals for one-tenth-megacycle operation of the 51X-4. A two-position switch selects one of two crystals for even one-hundredth- or five-hundredths-megacycle operation. If the megacycle and one-tenth-megacycle switches S1 and S2 are positioned as shown in figure 15, control wires A and C are grounded for both decade systems. The two-out-of-five binary code indicates that the 2-megacycle and the two-tenths-megacycle circuitry are selected; therefore the frequency of operation for the 51X-4 will be 112.20 or 112.25 megacycles, depending on the position of S3.

Parallel operation is employed to select the crystals for operation of the 51V-4B from the same control unit. Each crystal in the 51V-4B is selected by both five-wire-per-decade systems. Only four of the one-megacycle control wires are needed with five one-tenth-megacycle control wires to select the 20 crystals for the glide slope channels.

The 51V-4B will operate on the glide slope frequency in the 329.3- to 335.0-mc frequency range that is paired with a localizer frequency, an odd-tenth megacycle in the 108.10- to 111.90-mc frequency range. Figure 16 is a table of the localizer-glide slope frequency pairing.


CONTROL UNIT
IMC
S1
.IMC
S2
S3
.05MC
.00MC
A
B
C
D
E
A
B
C
D
E
C
B
11
12
6
7
8
9
10
5
4
3
2
1
.IMC CONTROL
IMC CONTROL
51X-4
9
11
14
12
13
6
8
5
7
51V-4B

	1	2	3	4	5	6	7	8	9	0
A	X	X						X	X	
B	X		X	X						X
C		X	X		X	X				
D				X	X		X	X		
E						X	X		X	X

2-OUT-OF-5 BINARY CODE

51RV-1 Two-out-of-Five Frequency Scheme
Figure 15

LOCALIZER FREQUENCY (mc)	GLIDE SLOPE FREQUENCY (mc)	LOCALIZER FREQUENCY (mc)	GLIDE SLOPE FREQUENCY (mc)
108.1	334.7	110.1	334.4
108.3	334.1	110.3	335.0
108.5	329.9	110.5	329.6
108.7	330.5	110.7	330.2
108.9	329.3	110.9	330.8
109.1	331.4	111.1	331.7
109.3	332.0	111.3	332.3
109.5	332.6	111.5	332.9
109.7	333.2	111.7	333.5
109.9	333.8	111.9	331.1

Table of Localizer Glide Slope - Frequency Pairings
Figure 16

E. 51V-4B Detailed Circuit Theory.

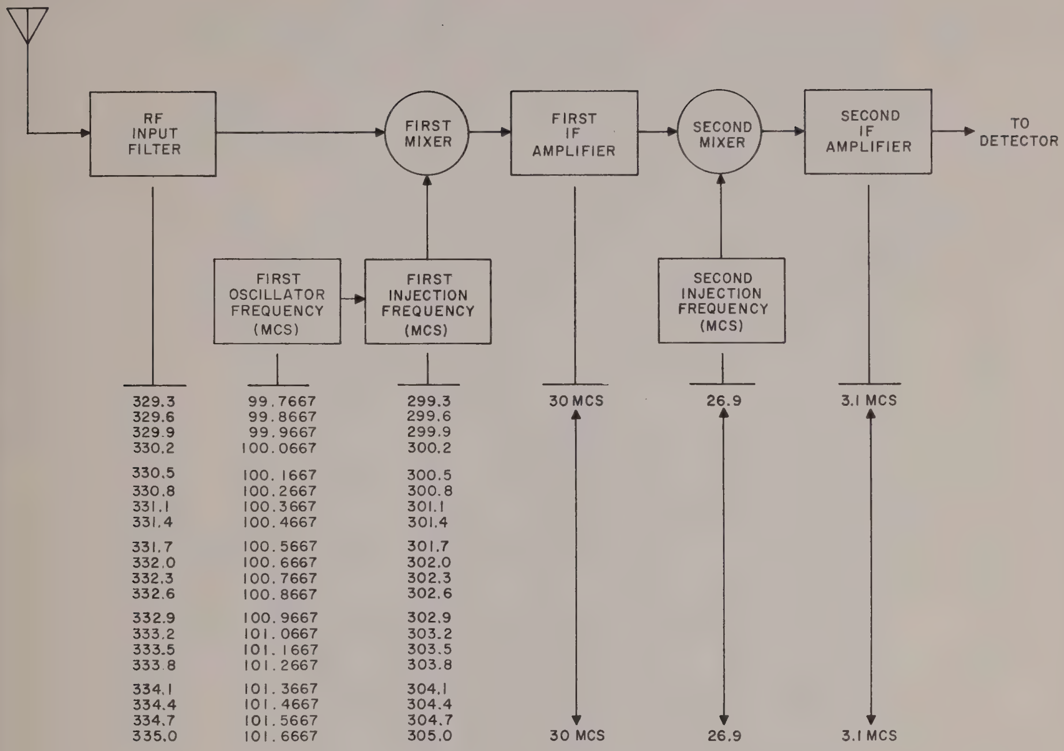
(1) General.

The frequency scheme of the 51V-4B operation as a dual-conversion receiver is shown in figure 17. When the 51V-4B is tuned to receive a glide slope frequency of 329.3 megacycles, the first oscillator is operating at a frequency of 99.7667 megacycles. This oscillator frequency is tripled and coupled through an injection amplifier to the first mixer. This injection frequency, 299.3 megacycles, and the r-f input frequency, 329.3 megacycles, are combined in the first mixer. The difference, 30 megacycles, is selected and coupled through the first i-f amplifier to the second mixer. This 30-megacycle signal is combined with the 26.9-megacycle second injection frequency. The difference, 3.1 megacycles, is selected and coupled through the second i-f amplifier to the detector. The first oscillator and first injection frequency are listed for each r-f input frequency.

(2) First Oscillator, Tripler, and 300-Mc Injection Amplifier.

(a) First Oscillator Crystal Selection.

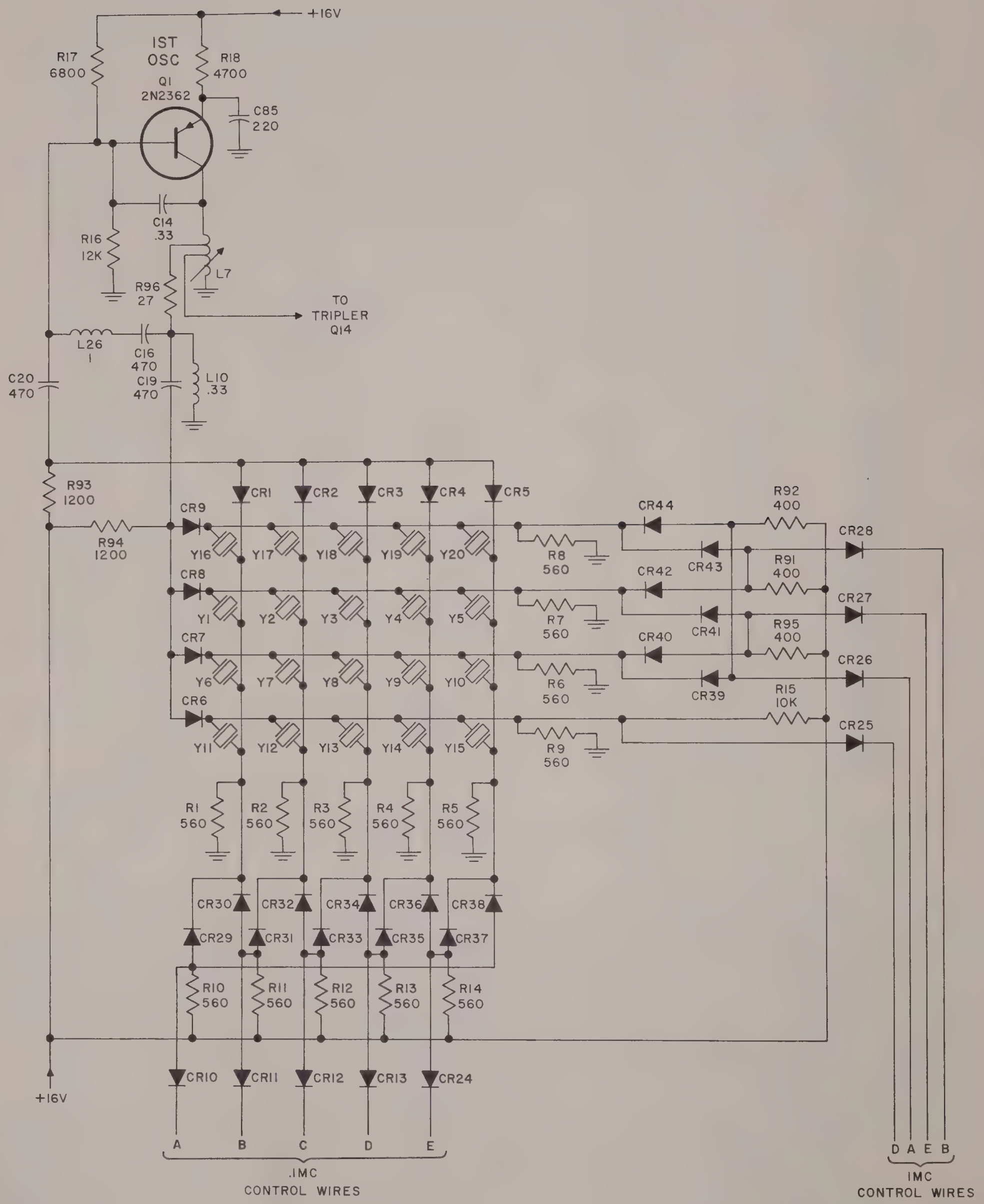
Two one-megacycle and two one-tenth-megacycle control wires will be grounded when a localizer frequency is selected at the navigation control unit. A simplified


RF INPUT FILTER
FIRST MIXER
FIRST IF AMPLIFIER
SECOND MIXER
SECOND IF AMPLIFIER
TO DETECTOR
FIRST OSCILLATOR FREQUENCY (MCS)
FIRST INJECTION FREQUENCY (MCS)
SECOND INJECTION FREQUENCY (MCS)
329.3 329.6 329.9 330.2 330.5 330.8 331.1 331.4 331.7 332.0 332.3 332.6 332.9 333.2 333.5 333.8 334.1 334.4 334.7 335.0
99.7667 99.8667 99.9667 100.0667 100.1667 100.2667 100.3667 100.4667 100.5667 100.6667 100.7667 100.8667 100.9667 101.0667 101.1667 101.2667 101.3667 101.4667 101.5667 101.6667
299.3 299.6 299.9 300.2 300.5 300.8 301.1 301.4 301.7 302.0 302.3 302.6 302.9 303.2 303.5 303.8 304.1 304.4 304.7 305.0
30 MCS
30 MCS
26.9
26.9
3.1 MCS
3.1 MCS

51V-4B Frequency Scheme
Figure 17

schematic of the matrix used to select the crystal which is connected in the first oscillator circuit is shown in figure 18. The glide slope frequency is listed in figure 19 for each combination of control wires that are grounded along with the diode switches that are turned on and the crystal that is selected. All filter capacitors and r-f chokes are removed to simplify the schematic of the matrix. Refer to the 51V-4B main schematic, figure 802, for the location of these components.

A crystal is connected in the first oscillator circuit when one of the .1 MC diode switches (CR1 through CR5) and one of the 1 MC diode switches (CR6 through CR9) are turned on. Each .1 MC switch is turned on when two .1 MC control wires are grounded, and each 1 MC switch is turned on when two 1 MC control wires are grounded. If the .1 MC and 1 MC A and B control wires are grounded, diodes CR29 and CR30 in the .1 MC section and diodes CR43 and CR44 in the 1 MC section are reverse biased. Current flow through these diodes and R1 (.1 MC section) and R8


+16V
R17
6800
IST OSC
Q1
2N2362
R18
4700
C85
220
C14
.33
R16
12K
L7
R96
27
TO TRIPLER Q14
L26
1
C16
470
C19
470
L10
.33
C20
470
R93
1200
R94
1200
CR1
CR2
CR3
CR4
CR5
CR9
CR8
CR7
CR6
Y16
Y17
Y18
Y19
Y20
Y1
Y2
Y3
Y4
Y5
Y6
Y7
Y8
Y9
Y10
Y11
Y12
Y13
Y14
Y15
R8
560
R7
560
R6
560
R9
560
CR44
CR43
CR42
CR41
CR40
CR39
R92
400
R91
400
R95
400
R15
10K
CR28
CR27
CR26
CR25
R1
560
R2
560
R3
560
R4
560
R5
560
CR30
CR32
CR34
CR36
CR38
CR29
CR31
CR33
CR35
CR37
R10
560
R11
560
R12
560
R13
560
R14
560
CR10
CR11
CR12
CR13
CR24
+16V
A
B
C
D
E
.IMC CONTROL WIRES
D A E B
IMC CONTROL WIRES

51V-4B Simplified Crystal Selection, Schematic Diagram
Figure 18

CONTROL WIRES GROUNDED		GLIDE SLOPE FREQUENCY	DIODE SWITCHES	CRYSTAL SELECTED
.1 MC	1 MC			
AB	AB	331.7 mc	CR1, CR9	Y16
BC	AB	332.3 mc	CR2, CR9	Y17
CD	AB	332.9 mc	CR3, CR9	Y18
DE	AB	333.5 mc	CR4, CR9	Y19
AE	AB	331.1 mc	CR5, CR9	Y20
AB	AD	334.7 mc	CR1, CR6	Y11
BC	AD	334.1 mc	CR2, CR6	Y12
CD	AD	329.9 mc	CR3, CR6	Y13
DE	AD	330.5 mc	CR4, CR6	Y14
AE	AD	329.3 mc	CR5, CR6	Y15
AB	AE	331.4 mc	CR1, CR7	Y6
BC	AE	332.0 mc	CR2, CR7	Y7
CD	AE	332.6 mc	CR3, CR7	Y8
DE	AE	333.2 mc	CR4, CR7	Y9
AE	AE	333.8 mc	CR5, CR7	Y10
AB	BE	334.4 mc	CR1, CR8	Y1
BC	BE	335.0 mc	CR2, CR8	Y2
CD	BE	329.6 mc	CR3, CR8	Y3
DE	BE	330.2 mc	CR4, CR8	Y4
AE	BE	330.8 mc	CR5, CR8	Y5

Table of 51V-4B Crystal Matrix Components
Figure 19

(1 MC section) is cut off and the voltage across R1 and R8 is lowered, placing a forward bias on diode switches CR1 and CR9. The diodes are turned on and connect crystal Y16 between base and collector of first oscillator transistor Q1.

Approximately 5.2 volts is developed across R1 and R8 as a result of current flow through diode switches CR1 and CR9 and these resistors. This voltage is applied to the anodes of .1 MC diode switches CR2 through CR5 and 1 MC diode switches CR6 through CR8. The remaining control wires will be open and at least one diode is conducting to allow current to flow through resistors R2 through R5 and resistors R6, R7, and R9. Approximately 6.2 volts is developed across each of these resistors and applied to the cathodes of diode switches CR2 through CR5 and CR6 through CR8. These diode switches are then reverse biased (turned off).

(b) Oscillator and Injection Circuitry. (Refer to figure 18 and figure 802.)

The first oscillator uses a 2N2362 in a common emitter configuration. Energy from the collector of Q1 is fed back to the base circuit through the crystal selected by the two-out-of-five frequency selector. The output from Q1 is tapped from L7 and coupled to tripler Q14 through capacitor C48. Capacitor C14 assures proper phase relationship between base and collector, and resistors R16, R17, and R18 bias the transistor. Inductors L26 and L10 compensate for crystal and diode switch capacitance.

Transistor Q14 is operated beyond its linear region as a tripler. Capacitor C15 in the collector circuit of Q14 is adjusted to resonate with L9 at 300 mc, so the third harmonic of the first oscillator frequency is developed across L9. This signal is coupled through capacitor C49 to the 300-mc injection amplifier. Transistor Q15 is used in a common base configuration to amplify the signal obtained from the frequency tripler. The output of Q15 is tuned to 300 megacycles by C17. The output from the amplifier is coupled through capacitor C8 to the first mixer, CR14.

(3) R-F Input Band-Pass Filter and First Mixer. (Refer to figure 802.)

The r-f input signal is coupled from pin A2 of the 51V-4B rear connector J1 to the tap on inductor L1 of the first section of a four-section band-pass filter. This filter circuit is tuned to 332 megacycles by means of brass slugs. The glide slope r-f signal is coupled to the first mixer from a tap on inductor L4 of the fourth section of the filter. The glide slope r-f signal is mixed with the 300-mc injection amplifier output in diode CR14. Inductor L6 is antiresonant at 30 megacycles, so the difference frequency developed by CR14 is coupled to the 30-megacycle i-f amplifier, Q2.

(4) 30-Megacycle I-F Amplifier, Second Mixer-Oscillator. (Refer to figure 802.)

The 30-megacycle i-f amplifier consists of transistor Q2 and associated circuitry. The difference frequency developed across inductor L6 is coupled through C9 to the base of Q2. The i-f signal is amplified and coupled from the collector of Q2 to 30-megacycle filter FL1. The output of FL1 is applied to the base of transistor Q3. This transistor operates as a mixer, but includes an oscillator in the emitter circuit which oscillates at 26.9 megacycles (frequency of crystal Y21). The 30-megacycle output of FL1 and the 26.9-mc output of the oscillator are mixed, and the difference frequency is coupled through the 3.1-megacycle filter, FL2, to the input circuit of first 3.1-megacycle i-f amplifier Q4.

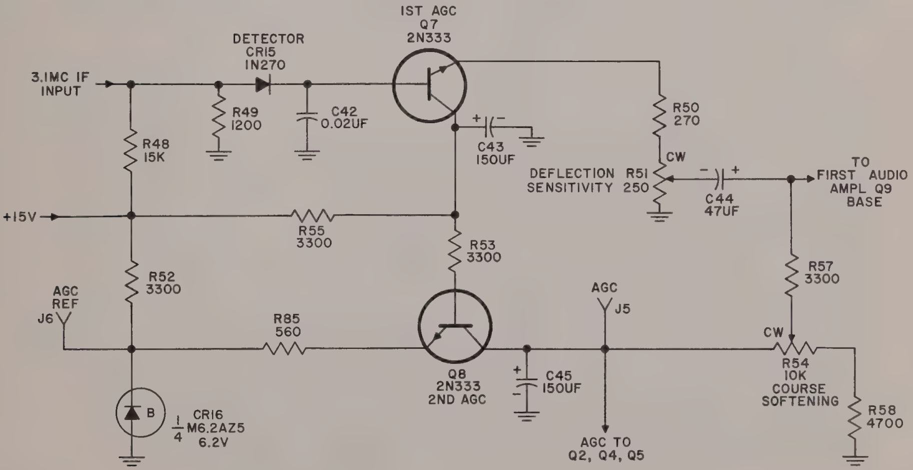
(5) 3.1-Megacycle I-F Amplifier. (Refer to figure 802.)

The 3.1-megacycle i-f signal from FL2 is coupled to the base of the first 3.1-megacycle amplifier Q4. Three amplifiers Q4, Q5, and Q6 are conventional common emitter amplifiers with single-tuned transformers in the collector circuits. Capacitors C29, C34, and C38 are used for neutralization. They provide properly phased feedback to increase the stability of the i-f amplifiers. The secondary of the last i-f transformer, T3, is used only as a neutralization source. Coupling from the collector of Q6 to the detector is capacitive through C40. An i-f gain control, R38, is connected across the secondary of transformer T1. This control is adjusted until the flag current just reaches maximum with an input signal of 332 megacycles at a 4-microvolt level applied to the 51V-4B antenna input.

(6) AGC/Audio Detector and AGC Amplifiers. (Refer to figure 20.)

The output from the third i-f amplifier is rectified by diode CR15. Detected audio and a d-c component (which is used for agc) proportional to carrier strength appear at the base of transistor Q7. Transistor Q7 functions as an emitter-follower for audio signals and as a d-c amplifier for the d-c component. The audio output from this stage is tapped off deflection sensitivity potentiometer R51. This audio signal is then coupled through C44 to the base of first audio amplifier Q9.

The d-c component at the collector of Q7 is applied to, and amplified by, second agc amplifier Q8. A portion of the output of Q8, agc voltage, is applied through R54 to the first audio amplifier stage as course-softening bias to reduce deflection sensitivity at

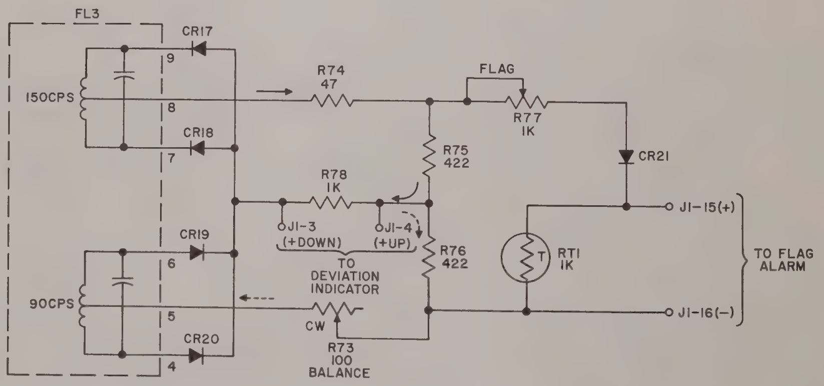

IST AGC
Q7
2N333
DETECTOR
CR15
1N270
3.1MC IF
INPUT
R49
1200
C42
0.02UF
R50
270
R48
15K
+
−
C43
150UF
CW
DEFLECTION R51
SENSITIVITY 250
−
+
C44
47UF
TO
FIRST AUDIO
AMPL Q9
BASE
+15V
R55
3300
R53
3300
R57
3300
AGC
REF
J6
R52
3300
R85
560
AGC
J5
CW
R54
10K
COURSE
SOFTENING
Q8
2N333
2ND AGC
+
C45
150UF
R58
4700
B
1/4 CR16
M6.2AZ5
6.2V
AGC TO
Q2, Q4, Q5

51V-4B Detector and AGC Circuitry
Figure 20

the high signal levels encountered when the aircraft approaches the runway. Course-softening control R54 is adjusted to obtain a deviation current of 78 ±2.0 microamperes for a standard glide slope deviation signal input at a 14,000-microvolt level. Agc voltage, which is proportional to the carrier level, is filtered by C43, R53, and C45 to remove any remaining audio or i-f component and applied to the 30-megacycle i-f and first two 3.1-megacycle i-f amplifiers. Breakdown diode (Zener) CR16 is used to maintain the agc reference level at 6.2 volts d-c. This bias prevents any agc voltage from being applied to the i-f amplifiers when very weak signals are received.

(7) Audio Amplifiers and Output Circuitry.

The detected audio applied to the base of Q9 is amplified and transformer coupled to a push-pull second audio amplifier stage containing transistors Q10 and Q11 (figure 802). The output of the second audio amplifier is coupled to the output circuitry through filter FL3. The filter has two tuned secondaries, one resonant at 150 cps and the other resonant at 90 cps. Each audio signal is rectified by a full-wave rectifier as shown in figure 21. The 90 cps rectifier voltage developed across R78 causes current to flow through the deviation indicator in the direction shown by the solid arrows. This current deflects the needle up and produces a positive voltage at J1-4. Current resulting from the 90-cps rectifier output deflects the deviation needle down and produces a positive voltage at J1-3. If the 150- and 90-cps signals are equal, zero voltage will be developed across R78 and zero current will flow to center the deviation needle. Balance control R73 is adjusted to provide zero-microampere deviation with a standard glide slope centering signal input. The sum of the voltages developed across R75 and R76 causes current to flow through the flag alarm of the course indicator to mask the glide slope flag. Flag control R77 is adjusted to provide 375 microamperes through the flag alarm with a standard glide slope centering signal input. Deflection sensitivity control R51 is adjusted to obtain 78



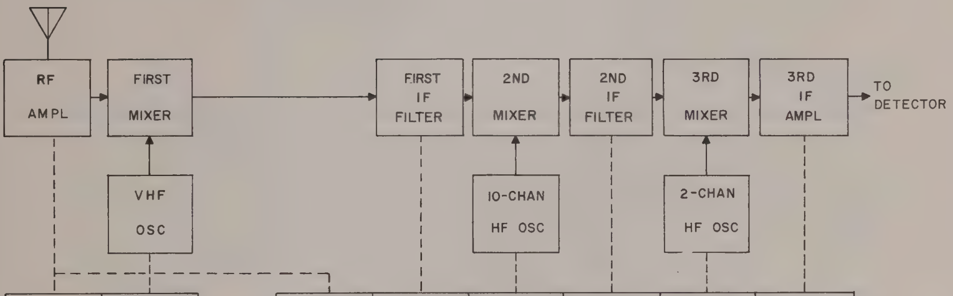
51V-4B Output Circuitry, Simplified Schematic Diagram
Figure 21

microamperes deviation current for a standard glide slope deviation signal input. When one signal or both are lost because of airborne or ground equipment failure, the flag alarm will be visible to indicate that further use of the facility is unreliable. Thermal resistor RT1 provides temperature compensation in the flag alarm circuit.

F. 51X-4 Detailed Circuit Theory.

(1) General.

The frequency scheme of the 51X-4 operation as a triple conversion receiver is shown in figure 22. The frequency of the vhf oscillator remains the same for each megacycle of operation. The spacing between each megacycle channel of operation of the 51X-4 is 50 kilocycles (.05 mc); therefore, there will be 20 different output frequencies coupled



RF INPUT (MC)	VHF OSC FREQ (MC)
108.XX	86.45
109.	87.45
110.	88.45
111.	89.45
112.	90.45
113.	91.45
114.	92.45
115.	93.45
116.	94.45
117.	95.45

RF INPUT (MC)	FIRST IF (MC)	10-CHAN HF OSC FREQ (MC)	SECOND IF (MC)	2-CHAN HF OSC FREQ (MC)	THIRD IF (KC)
XXX.00	21.55	16.95	4.60	5.1	500
.05	21.60	16.95	4.65	5.15	500
.10	21.65	17.05	4.60	5.1	500
.15	21.70	17.05	4.65	5.15	500
.20	21.75	17.15	4.60	5.1	500
.25	21.80	17.15	4.65	5.15	500
.30	21.85	17.25	4.60	5.1	500
.35	21.90	17.25	4.65	5.15	500
.40	21.95	17.35	4.60	5.1	500
.45	22.00	17.35	4.65	5.15	500
.50	22.05	17.45	4.60	5.1	500
.55	22.10	17.45	4.65	5.15	500
.60	22.15	17.55	4.60	5.1	500
.65	22.20	17.55	4.65	5.15	500
.70	22.25	17.65	4.60	5.1	500
.75	22.30	17.65	4.65	5.15	500
.80	22.35	17.75	4.60	5.1	500
.85	22.40	17.75	4.65	5.15	500
.90	22.45	17.85	4.60	5.1	500
.95	22.50	17.85	4.65	5.15	500

51X-4 Frequency Scheme
Figure 22

from the first mixer to the first i-f filter for each megacycle of operation. These 20 frequencies will remain the same through the 51X-4 frequency range, because the frequency of the vhf oscillator is increased by one megacycle for each megacycle increase in receiver operation. The first i-f is combined with the frequency of the 10-channel h-f oscillator in the second mixer. The 10-channel h-f oscillator frequency is changed for every tenth-megacycle at which the receiver is operating. Thus, the difference frequency coupled from the second mixer is only one of two second intermediate frequencies. These are combined with one of two frequencies from the 2-channel h-f oscillator. The two frequencies of this oscillator are changed by the .01-megacycle selector (selected for the .00- to .05-megacycle frequencies).

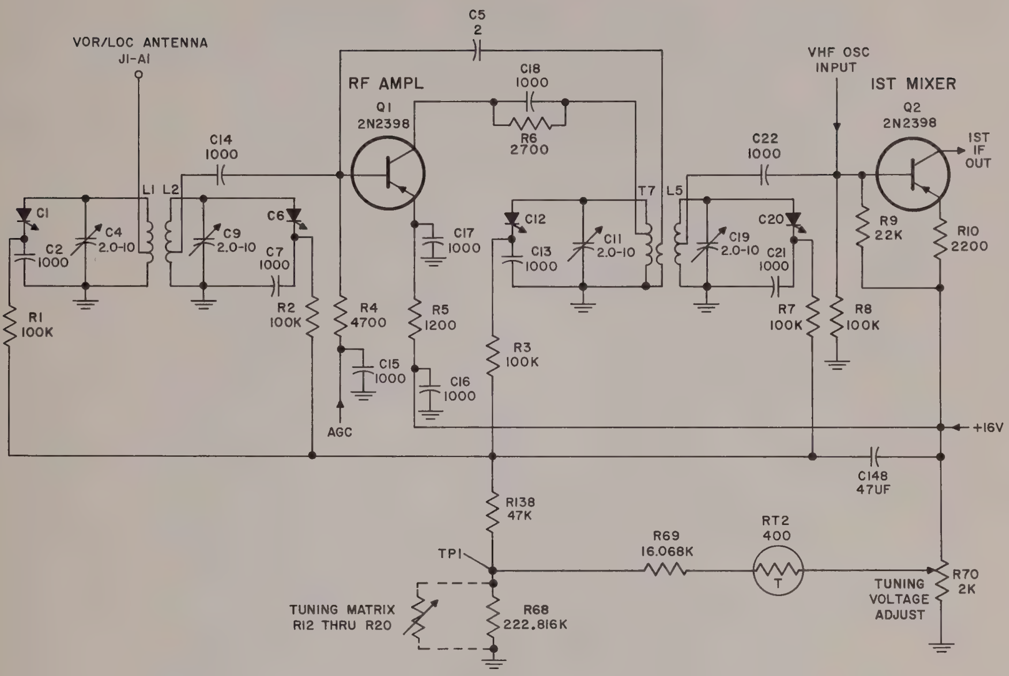
If the 51X-4 is tuned to operate at a frequency of 110.45 megacycles, the oscillator and i-f frequencies throughout the triple conversion are as follows. The vhf oscillator frequency is 88.45 megacycles and is coupled to the first mixer. The output of the first mixer (first i-f) is 22.00 megacycles. The 10-channel h-f oscillator frequency is 17.35 megacycles, the second i-f is 4.65 megacycles, the 2-channel h-f oscillator frequency is 5.15 megacycles, and the third i-f is 500 kilocycles.

(2) R-F Subassembly and Tuning Matrix. (Refer to figure 23.)

The vhf navigation signal is coupled to the 51X-4 r-f subassembly through J1-A1. The signal is coupled through two tuned r-f input circuits; an amplifier Q1; and two interstage tuned circuits to the first mixer. The r-f input and interstage circuits are tuned for each megacycle that the 51X-4 is tuned to by the application of a d-c tuning voltage to the cathodes of varactors C1, C6, C12, and C20. This tuning voltage, developed at TP1, is supplied by the tuning matrix. A simplified schematic diagram of the tuning matrix, illustrating its operation when the tuning voltage for a frequency of operation is 111 megacycles, is shown in figure 24. Discussion of tuning matrix operation follows below.

Agc is applied to the base of the common emitter r-f amplifier. The parallel RC circuit, R6 and C18, in the collector of Q1 helps to keep the agc control of the amplifier at a maximum. Neutralization of the amplifier is provided by coupling a small signal from the secondary of T7 through C5 to the base of Q1.

The tuning matrix applies a tuning voltage to varactors C1, C6, C12, and C20 for each megacycle of the operating frequency range of the receiver. Thermistor RT2 stabilizes the temperature variations of the r-f input tuned circuits. One of ten resistances is selected to develop this tuning voltage for each megacycle step. Diodes are controlled to select resistor R68 as one resistance or switch one of nine resistors (R12 through R20) in the circuit with R68. Figure 24 illustrates the matrix operation before and after a frequency of 111 megacycles is selected at the control unit (ground placed on control wires A and B). Before these wires are grounded, diodes CR17 and CR18 are forward biased. Current flow through these diodes and resistor R17 develops a positive voltage which is applied to the cathode of tuning diode CR16 to reverse bias the diode. This occurs because the tuning voltage applied to the anode of the diode is negative with respect to the voltage applied to the cathode. When a frequency of 111 megacycles is selected, control wires A and B are grounded to reverse bias diodes CR67 and CR68. Tuning diode CR16 will now be forward biased and connect R17 in the circuit with R68. The voltage developed across the parallel resistance is applied to the varactors C1, C6, C12, and C20. These varactors function electrically like variable capacitors, because


C5
2
VOR/LOC ANTENNA
JI-AI
RF AMPL
C18
1000
VHF OSC
INPUT
IST MIXER
Q1
2N2398
R6
2700
Q2
2N2398
IST
IF
OUT
C14
1000
C22
1000
L1
L2
T7
L5
C1
C4
2.0-10
C2
1000
C9
2.0-10
C6
C7
1000
C17
1000
C12
C13
1000
C11
2.0-10
C19
2.0-10
C20
C21
1000
R9
22K
R10
2200
R1
100K
R2
100K
R4
4700
R5
1200
C15
1000
C16
1000
R3
100K
R7
100K
R8
100K
AGC
+16V
C148
47UF
R138
47K
R69
16.068K
RT2
400
T
TP1
R70
2K
TUNING
VOLTAGE
ADJUST
TUNING MATRIX
R12 THRU R20
R68
222.816K

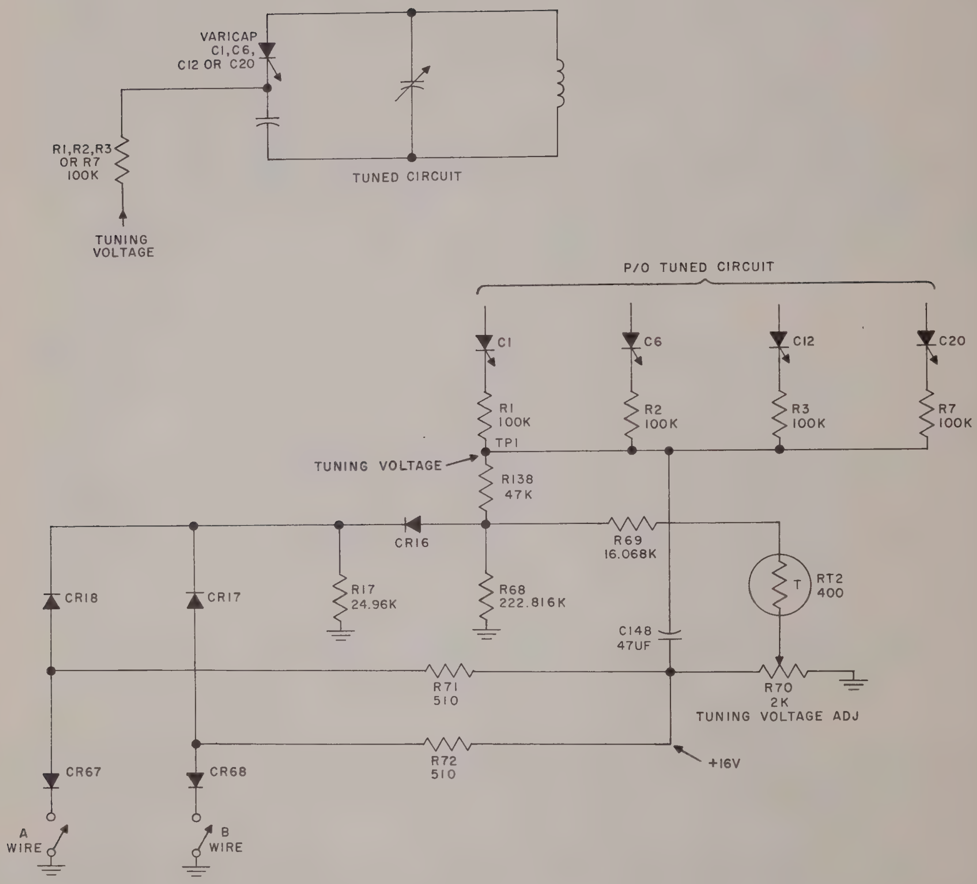
51X-4 R-F Subassembly, Simplified Schematic Diagram
Figure 23

their capacity varies as the voltage across them changes. Thus the r-f stages will be tuned for each megacycle step, using the components listed in figure 25. Tuning voltage adjust control R70 is set to provide 13.364 volts at TP1 when the 51X-4 is tuned to 117 megacycles.

The r-f amplifier Q1 uses a 2N2398 transistor in a common emitter configuration. Refer to figure 808. Agc voltage is applied to the base. The signal is coupled through the interstage tuned circuits in the collector circuit to first mixer Q2. The vhf oscillator injection frequency is also coupled to the first mixer. The mixer output is coupled to filter FL1.

(3) VHF Oscillator Subassembly.

The crystal selected by the megacycle two-out-of-five frequency selector determines the vhf oscillator operating frequency. The components used to select crystal Y4 for an operating frequency of 111 megacycles are shown in figure 26. Before crystal Y4 is selected, diodes CR29 and CR37 are reverse biased. Control diodes CR29 and CR37 are


VARICAP
C1, C6,
C12 OR C20
R1, R2, R3
OR R7
100K
TUNING
VOLTAGE
TUNED CIRCUIT
P/O TUNED CIRCUIT
C1
C6
C12
C20
R1
100K
R2
100K
R3
100K
R7
100K
TP1
TUNING VOLTAGE
R138
47K
CR16
R69
16.068K
RT2
400
T
CR18
CR17
R17
24.96K
R68
222.816K
C148
47UF
R71
510
R70
2K
TUNING VOLTAGE ADJ
R72
510
+16V
CR67
CR68
A
WIRE
B
WIRE

51X-4 R-F Filter Tuning, Simplified Schematic Diagram
Figure 24

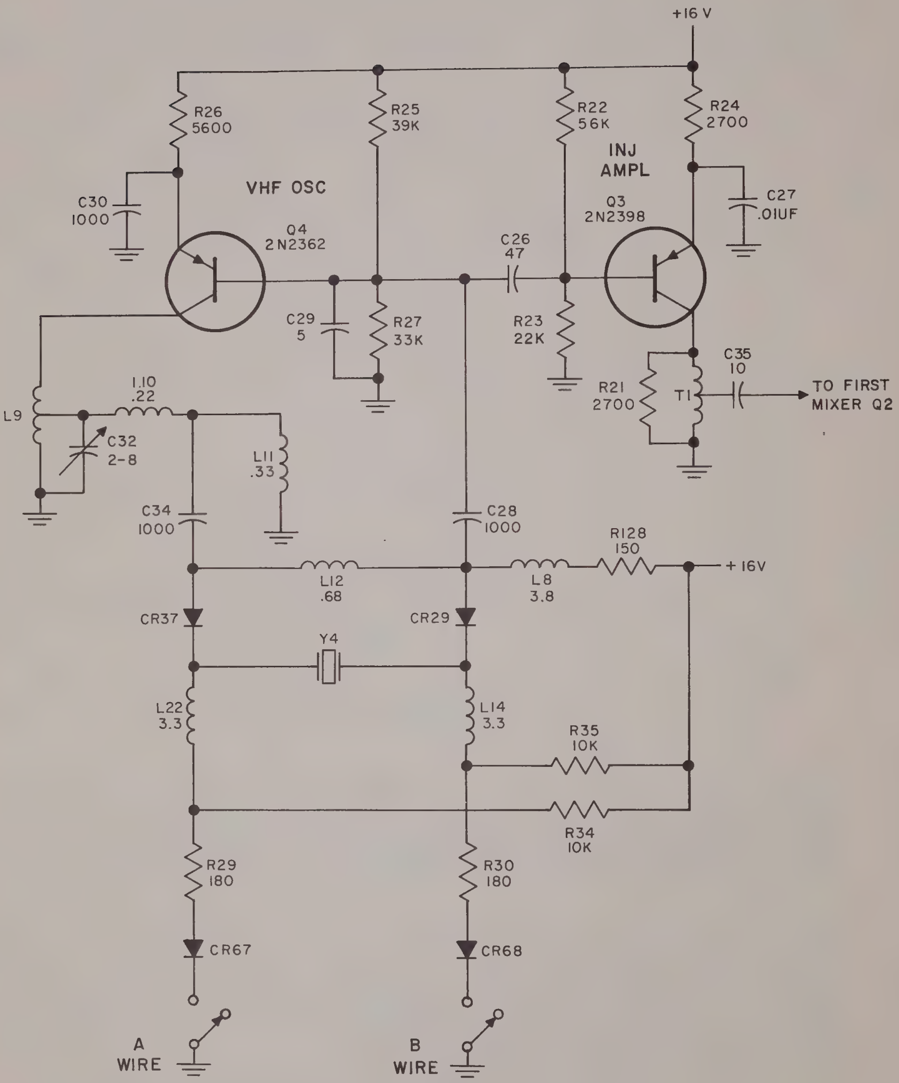
FREQ (mc)	CONTROL WIRES GROUNDED	ISOLATION DIODES	CONTROL RESISTORS	CONTROL DIODES	TUNING DIODES	TUNING RESISTORS
111	AB	CR67, CR68	R71, R72	CR17, CR18	CR16	R68 and R17
112	AC	CR67, CR69	R71, R73	CR14, CR15	CR13	R68 and R16
113	BC	CR68, CR69	R72, R73	CR11, CR12	CR10	R68 and R15
114	BD	CR68, CR70	R72, R74	CR8, CR9	CR7	R68 and R14
115	CD	CR69, CR70	R73, R74	CR5, CR6	CR4	R68 and R13
116	CE	CR69, CR71	R73, R75	CR2, CR3	CR1	R68 and R12
117	DE	CR70, CR71	R74, R75	None	None	R68 only
108	DA	CR70, CR67	R74, R71	CR26, CR27	CR25	R68 and R20
109	EA	CR71, CR67	R75, R71	CR23, CR24	CR22	R68 and R19
110	EB	CR71, CR68	R75, R72	CR20, CR21	CR19	R68 and R18

Table of 51X-4 Tuning Matrix Components
Figure 25

forward biased when control wires A and B (111 mc selected) are grounded. These diodes conduct and provide a low-impedance path to connect crystal Y4 between the base of Q4 and the collector tuned circuit of the vhf oscillator. The corresponding components used to select crystals for the other megacycle steps are listed in figure 27.

Inductor L12 compensates for capacitance of the crystal, and inductor L10 compensates for the diode switch capacitance. The collector tuned circuit, consisting of capacitor C32 and a portion of inductor L9, is tuned to approximately 70 megacycles. Inductor L11 and capacitor C33 are resonant at approximately 70 megacycles to prevent oscillations at the collector tuned circuit frequency.

Regenerative feedback is coupled from the collector to the base through the crystal and capacitors C34 and C28. The output of the oscillator is coupled through capacitor C26 to the base of injection amplifier Q3. The stage provides isolation between the oscillator and mixer, and is broadly tuned. The band pass is approximately 20 megacycles. The output of the injection amplifier is coupled through transformer T1 and capacitor C35 to the first mixer Q2.


+16 V
R26
5600
R25
39K
R22
56K
R24
2700
INJ
AMPL
C30
1000
VHF OSC
Q4
2N2362
Q3
2N2398
C27
.01UF
C26
47
C29
5
R27
33K
R23
22K
C35
10
R21
2700
T1
TO FIRST
MIXER Q2
L9
L10
.22
C32
2-8
L11
.33
C34
1000
C28
1000
R128
150
+ 16V
L12
.68
L8
3.8
CR37
CR29
Y4
L22
3.3
L14
3.3
R35
10K
R34
10K
R29
180
R30
180
CR67
CR68
A
WIRE
B
WIRE

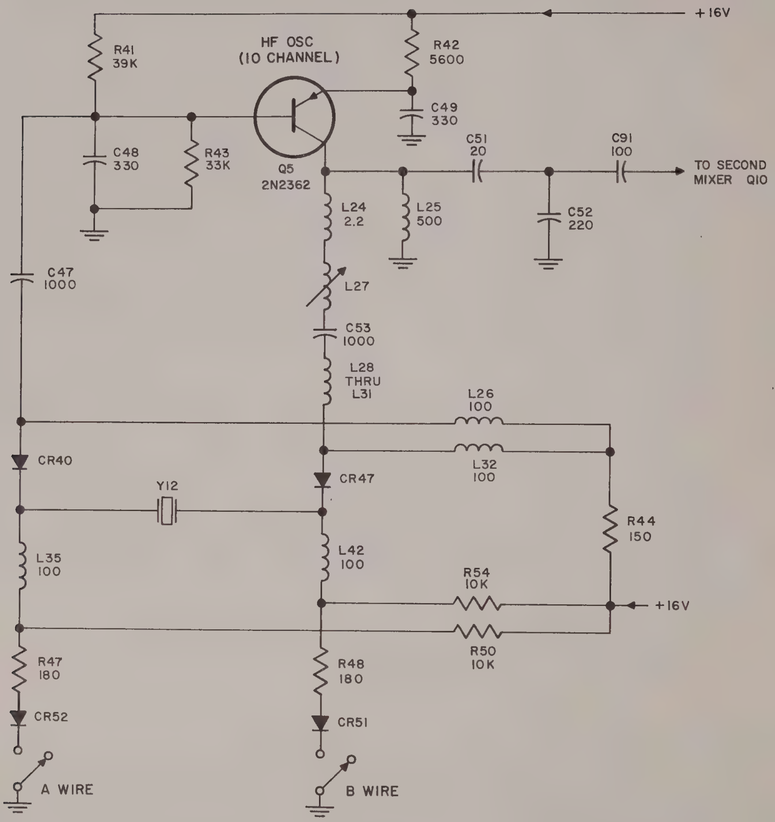
51X-4 VHF Oscillator Crystal Selection, Simplified Schematic Diagram
Figure 26

FREQ (mc)	CONTROL WIRES GROUNDED	ISOLATION DIODES	ISOLATION RESISTORS	CONTROL RESISTORS	INDUCTORS	CONTROL DIODES	CRYSTALS
111	AB	CR67, CR68	R29, R30	R34, R35	L14, L22	CR29, CR37	Y4
112	AC	CR67, CR69	R29, R31	R34, R36	L15, L22	CR30, CR37	Y5
113	BC	CR68, CR69	R30, R31	R35, R36	L15, L21	CR30, CR36	Y6
114	BD	CR68, CR70	R30, R32	R35, R37	L16, L21	CR31, CR36	Y7
115	CD	CR69, CR70	R31, R32	R36, R37	L16, L20	CR31, CR35	Y8
116	CE	CR69, CR71	R31, R33	R36, R38	L17, L20	CR32, CR35	Y9
117	DE	CR70, CR71	R32, R33	R37, R38	L17, L19	CR32, CR34	Y10
108	DA	CR70, CR67	R32, R29	R37, R34	L13, L19	CR28, CR34	Y1
109	EA	CR71, CR67	R33, R29	R38, R34	L13, L18	CR28, CR33	Y2
110	EB	CR71, CR68	R33, R30	R38, R35	L14, L18	CR29, CR33	Y3

Table of 51X-4 VHF Oscillator Crystal Matrix Components
Figure 27

(4) Second Mixer and 10-Channel H-F Oscillator.

The difference frequency of the vhf oscillator and r-f signals combined in mixer Q2 is selected by filter FL1. Filter FL1 is tuned to 22 megacycles with a one-megacycle bandwidth. This first i-f signal is fed to the base of second mixer Q10. The frequency of the 10-channel h-f oscillator is also fed to the base of Q10. A crystal selected by the tenths-megacycle two-out-of-five frequency selector determines the operating frequency of this h-f oscillator. The components used to select the crystal for the one-tenth-megacycle operating frequency are shown in figure 28. Before crystal Y12 is selected, control diodes CR40 and CR47 are reverse biased. These diodes are forward biased when control wires A and B are grounded (.1 MC selected). These diodes conduct and provide a low-impedance path to connect crystal Y12 in the oscillator circuit. The corresponding components used to select crystals for the other tenth-megacycle steps are listed in figure 29. The crystal is connected between the transistor base and the collector series tuned circuit. Inductors L27 and L24 and capacitor C53 are tuned so the oscillator operates on the series mode of the crystal. Regenerative feedback is provided from the collector to base through capacitor C47 and the crystal. Inductors L26 and L32 keep the r-f signal out of the B+ circuit, and inductors L35 and L42 isolate the r-f signal from


+16V
R41
39K
HF OSC
(10 CHANNEL)
R42
5600
C49
330
C48
330
R43
33K
Q5
2N2362
C51
20
C91
100
TO SECOND
MIXER Q10
L24
2.2
L25
500
C52
220
C47
1000
L27
C53
1000
L28
THRU
L31
L26
100
L32
100
CR40
Y12
CR47
R44
150
L35
100
L42
100
R54
10K
+16V
R50
10K
R47
180
R48
180
CR52
CR51
A WIRE
B WIRE

51X-4 10-Channel HFO Crystal Selection, Simplified Schematic Diagram
Figure 28

ground. Inductors L28 through L31 compensate for the changing frequency across the oscillator tuning range. Inductor L25 places the collector at d-c ground. The oscillator frequency is tapped off voltage divider C51 and C52 and coupled through C91 to the second mixer, Q10. The difference frequency of the first i-f and 10-channel h-f oscillator signals combined in second mixer Q10 is selected by filter FL2. Filter FL2 is tuned to 4.6 megacycles with a one-tenth-megacycle bandwidth. This second i-f signal is fed to the third mixer where it is combined with the 2-channel h-f oscillator output frequency.

FREQ (mc)	CONTROL WIRES GROUNDED	ISOLATION DIODES	ISOLATION RESISTORS	CONTROL RESISTORS	INDUCTORS	CONTROL DIODES	CRYSTALS
0.1	AB	CR52, CR53	R47, R48	R52, R51	L35, L42 L28, L31	CR40, CR47	Y12
0.2	AC	CR52, CR54	R47, R49	R52, R50	L35, L41 L28, L30	CR40, CR46	Y13
0.3	BC	CR53, CR54	R48, R49	R51, R50	L36, L41 L28, L30	CR41, CR46	Y14
0.4	BD	CR50, CR53	R45, R48	R54, R51	L36, L40 L28, L29	CR41, CR45	Y15
0.5	CD	CR50, CR54	R45, R49	R54, R50	L37, L40 L28, L29	CR42, CR45	Y16
0.6	CE	CR51, CR54	R46, R49	R53, R50	L37, L39 L28	CR42, CR44	Y17
0.7	DE	CR50, CR51	R45, R46	R54, R53	L33, L39 L28	CR38, CR44	Y18
0.8	DA	CR50, CR52	R45, R47	R54, R52	L33, L38	CR38, CR43	Y19
0.9	EA	CR51, CR52	R46, R47	R53, R52	L34, L38	CR39, CR43	Y20
0.0	EB	CR51, CR53	R46, R48	R53, R51	L34, L42 L28, L31	CR39, CR47	Y11

Table of 10-Channel H-F Oscillator Crystal Matrix Components
Figure 29

(5) Third Mixer, 2-Channel H-F Oscillator, and Third I-F Amplifiers. (Refer to figure 808.)

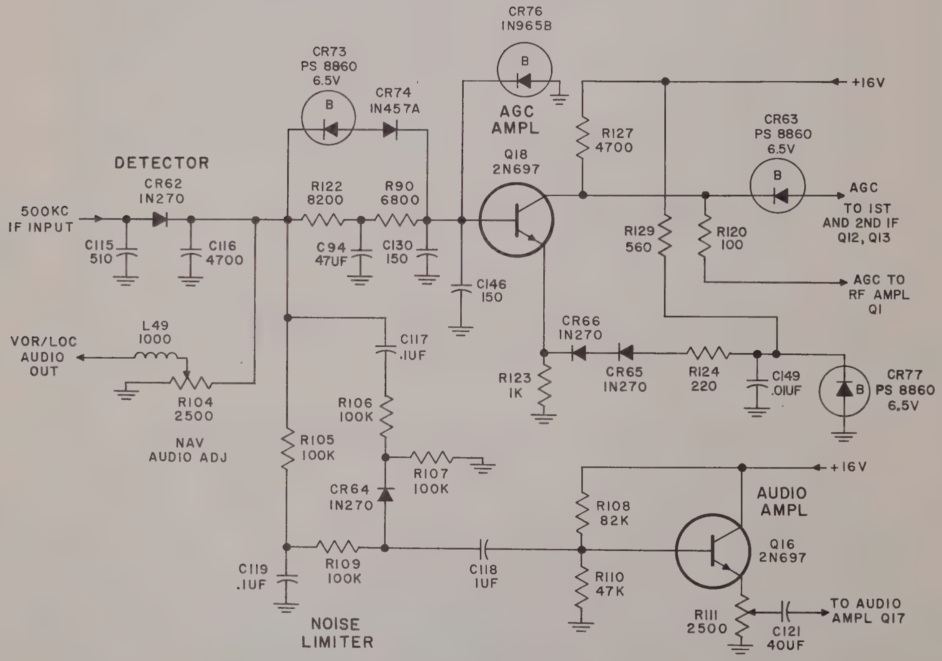
The 4.6-megacycle second i-f signal is coupled to third mixer Q11 and combined with the output frequency of the 2-channel h-f oscillator Q6. Either control wire B (.00 mc) or control wire C (.05 mc) (J1-11 and 12) is grounded for the 51X-4 frequency range. When the B control wire of the .05 megacycle control is grounded, diodes CR58 and CR55 are forward biased. Crystal Y21 is selected for determining the oscillator frequency of operation. Diodes CR56 and CR57 are forward biased to select crystal Y22 when control wire C is grounded. Crystal Y21 or Q22 is connected between transistor Q6 base and ground. (Inductors L44 and L45 isolate the r-f signal from the B+ circuit.) Regenerative feedback is coupled from the emitter to base through capacitor C67.

Capacitor C70 is part of the oscillator resonant circuit, and resistors R56, R57, and R58 provide the proper base and emitter bias for operation. Inductor L46 and capacitors C68 and C69 in the collector circuit are tuned to 5 megacycles and develop the oscillator frequency. The signal voltage across capacitor C69 is coupled through capacitor C97 to third mixer Q11. The difference frequency in the third mixer, 500 kc, is selected by filter FL3 and coupled through capacitor C101 to the first 500-kc i-f amplifier. The 500-kc i-f signal is transformer coupled through four common emitter amplifiers to detector CR62. Agc voltage is applied to the base of amplifiers Q12 and Q13, first and second i-f amplifiers, and to the base of r-f amplifier Q1. I-f gain control R95 is adjusted to provide 3.0 volts d-c at TP3 with an input signal level of approximately two microvolts.

(6) Detector Output Stages. (Refer to figure 30.)

The 500-kc i-f signal is coupled to detector CR62. The detected output is applied to agc amplifier Q18, noise limiter CR64, and navigation audio adjust control R104.

Navigation adjust control R104 is preset to provide 0.5 volt a-c at TP3 for an r-f input signal at a 1000-microvolt level and modulated 30 percent by 30 cps. This preset audio


CR76
1N965B
B
CR73
PS 8860
6.5V
B
CR74
1N457A
AGC
AMPL
Q18
2N697
+16V
R127
4700
CR63
PS 8860
6.5V
B
AGC
TO 1ST
AND 2ND IF
Q12, Q13
DETECTOR
CR62
1N270
500KC
IF INPUT
C115
510
C116
4700
R122
8200
R90
6800
C94
47UF
C130
150
C146
150
R129
560
R120
100
AGC TO
RF AMPL
Q1
VOR/LOC
AUDIO
OUT
L49
1000
R104
2500
NAV
AUDIO ADJ
C117
.1UF
CR66
1N270
R123
1K
CR65
1N270
R124
220
C149
.01UF
CR77
PS 8860
6.5V
B
R106
100K
R105
100K
R107
100K
CR64
1N270
+16V
AUDIO
AMPL
R108
82K
Q16
2N697
C119
.1UF
R109
100K
C118
1UF
R110
47K
R111
2500
C121
40UF
TO AUDIO
AMPL Q17
NOISE
LIMITER

51X-4 Detector Output Circuitry, Simplified Schematic Diagram
Figure 30

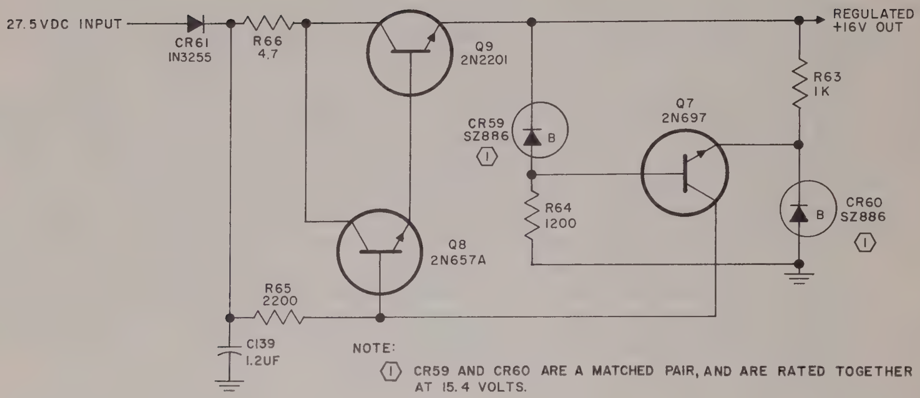
signal is coupled through inductor L49 and the 51X-4 VOR/LOC output terminals to the instrumentation units (344A-2 and 344F-1).

The detected output is filtered by R122, R90, R94, C130, and C146 and applied at the base of transistor Q18 (agc amplifier). As the detected output increases, the base voltage of Q18 becomes positive with respect to the emitter. Q18 collector current increases and a larger voltage is dropped across R127, reducing the collector voltage. This collector voltage is applied through R120 to forward bias r-f amplifier Q1 pnp transistor. Breakdown diode CR63 is used to keep the agc applied as reverse bias for the i-f amplifier npn transistors, Q12 and Q13, at a lower level and a constant difference from the r-f amplifier agc voltage. Breakdown diode CR73 allows rapid increases in detector output to be coupled instantaneously to the base of Q18 since the time constant of the RC filter (R122, C94, and R90 and C130) is of a long duration. Diode CR74 prevents reverse conduction through CR73. Junction diodes CR65 and CR66 are used for compensation of emitter-base junction resistance changes due to temperature variations.

Detector output is also coupled to audio amplifier Q16 through capacitor C117, noise limiter diode CR64, R106, and capacitor C118. The series type noise limiter uses a type 1N270 diode in a high-impedance circuit. The circuit is self-adjusting and designed to clip noise impulses above approximately 50-percent modulation and of duration shorter than 20 milliseconds. During normal operation, a positive voltage proportional to the carrier is developed across capacitor C119. This voltage is applied to the anode of CR64 and cannot change rapidly because R109 and C119 are relatively large. Audio voltage divider, R106 and R107, applies a lower voltage on the cathode of CR64. As long as the anode of CR64 is positive with respect to the cathode, diode CR64 acts as a conductor for the audio signal. The voltage across the diode is thus kept proportional to the carrier and is the means by which the circuit self-adjusts itself to operate for various signal input levels. Positive noise peaks exceeding the maximum carrier-modulation level will instantaneously drive the cathode of CR64 positive with respect to the anode. The diode will cease conducting and open the audio signal path, preventing the noise from being reproduced. Since the time constant of R105 and C119 is large, the reference level across C119 will increase slowly and allow the noise limiter to clip any noise pulse of duration shorter than 20 milliseconds. Negative noise peaks are clipped automatically at detector CR62. Resistor R109 is the noise limiter load. The output of the noise limiter is coupled through capacitor C118 to amplifier Q16. Aural adjustment R111 in the emitter of Q16 is preset to provide 100 milliwatts at the 51X-4 aural output terminals J1-15 and J1-17 (figure 810) for an r-f input at a 1000-microvolt level, modulated 30 percent with 1000 cps. The audio signal level at the arm of R111 is coupled through capacitor C121 to the base of audio amplifier Q17 (figure 810). The collector output is coupled through filter FL4 to aural output amplifiers Q19 and Q20. Filter FL4 is tuned to pass audio frequencies between 300 and 3500 cps. The amplified output of the aural output stage is floating and center tapped, and coupled through rear connector pins 15, 16, and 17 to the aircraft aural system.

(7) Regulated Power Supply. (Refer to figure 31.)

The regulated power supply provides a regulated +16 volts to the 51X-4 stages. The input 27.5-volt d-c power is applied through diode CR61 and resistor R66 to transistors Q8 and Q9. The output voltage is held at 16 volts by breakdown diodes CR59 and CR60 and the emitter-base junction of transistor Q7. Transistor Q7 is biased to provide an emitter-base



NOTE:
① CR59 AND CR60 ARE A MATCHED PAIR, AND ARE RATED TOGETHER AT 15.4 VOLTS.

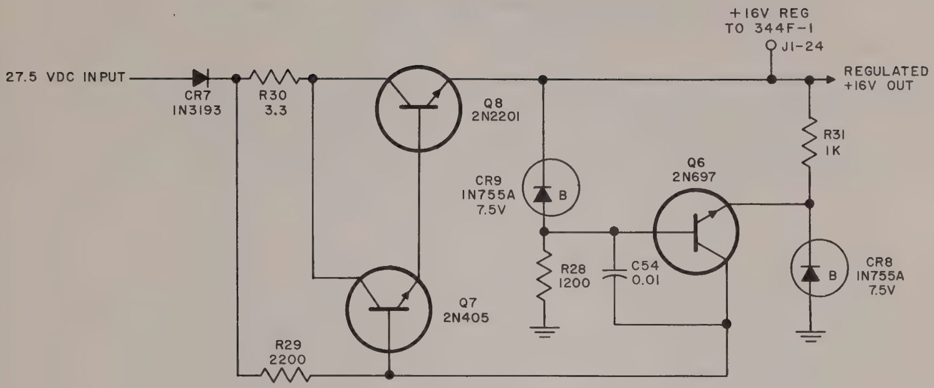
51X-4 Regulated Power Supply, Simplified Schematic Diagram
Figure 31

junction voltage of 0.6 volt. The total breakdown voltage for diodes CR59 and CR60 is 15.4 volts. If the output voltage tends to increase due to a change in load, the forward bias on transistor Q7 is increased. This occurs because the emitter voltage is held constant by CR60, and the base voltage increases because the voltage across CR59 is constant. Transistor Q7 emitter-collector current will increase through R65, increasing the voltage drop across R65 and lowering the voltage applied to the base of transistor Q8. The emitter-collector current of Q8 will decrease, and lower the emitter-collector current of Q9. The output voltage is lowered due to the decrease in Q9 emitter-collector current and compensates for the increase in output voltage. Diode CR61 protects the circuit from negative input voltages. Capacitor C139 filters audio frequencies which may be present on the receiver B+ line.

G. Instrumentation Units Detailed Theory.

(1) Regulated Power Supply.

Regulated +16 volts is applied to the 344A-2 and 344F-1 circuits from the power supply in the 344A-2. Refer to figure 32. The input 27.5-volt d-c power is applied through diode CR7 and resistor R30 to transistors Q7 and Q8. The output voltage is held at 16 volts by breakdown diodes CR8 and CR9 and the emitter-base junction of transistor Q6. Transistor Q6 is biased to provide an emitter-base junction voltage of 1.0 volt, and breakdown diodes CR8 and CR9 are each rated at +7.5 volts. If the output voltage tends to increase due to a change in load, the forward bias on transistor Q6 is increased. This occurs because the emitter voltage is held constant by CR8, and the base voltage increases since the voltage across CR9 is constant. Transistor Q6 emitter current through resistor R29 increases, increasing the voltage drop across R29 and lowering the voltage applied to the base of transistor Q7. The emitter-collector current of Q7 will decrease, thus lowering the emitter-collector current of Q8. The output voltage is lowered due to the decrease in Q8 emitter-collector current and compensates for the increase in output voltage.



344A-2 Regulated Power Supply, Simplified Schematic Diagram
Figure 32

Diode CR7 protects the circuit from negative input voltages. Capacitor C54 filters audio frequencies present on the instrumentation units B+ lines.

(2) Localizer Energize Circuitry.

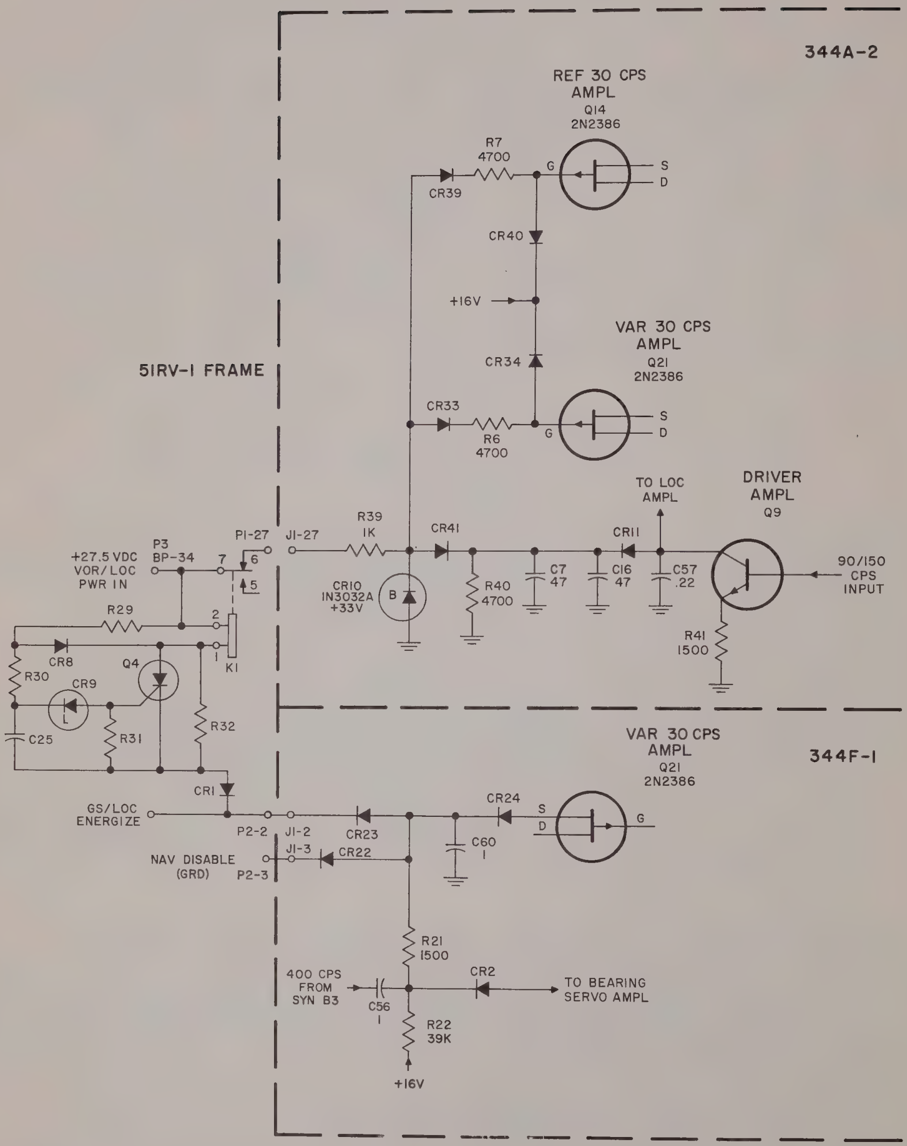
The localizer energize circuitry is activated when the 51RV-1 is tuned to a localizer frequency. The 344A-2 localizer stages are then enabled, and the 344A-2 and 344F-1 VOR stages are disabled. Relay K1 in the 51RV-1 frame (figure 33) is energized (after a two second delay) when the 51RV-1 is tuned to a localizer frequency. Plus 27.5 volts d-c is applied to the localizer circuits through relay K1 contacts 7 and 5, P1-27 and J1-27. The voltage developed across breakdown diode CR10 is applied through CR41 to the cathode of CR11, and through CR33 and CR39 to the gates of amplifiers Q21 and Q14, which use field effect transistors.

Diode switch CR11 is now reverse biased to enable driver amplifier Q9.

NOTE: During VOR operation, the plus 27.5 volts will not be applied to the cathode of CR11. The diode will be forward biased to ground the Q9 collector through resistor R40. This places lower bias voltage on the collector and disables the amplifier.

Audio signals are shorted to ground through capacitors C7 and C16.

The 27.5 volts d-c, applied to the gates of Q21 and Q14, disables the amplifiers in the variable and reference signal channels. Diodes CR34 and CR40 are forward biased and provide a low-impedance path to ground for the 30-cps signal.


344A-2
REF 30 CPS
AMPL
Q14
2N2386
R7
4700
G
S
D
CR39
CR40
+16V
VAR 30 CPS
AMPL
Q21
2N2386
CR34
51RV-1 FRAME
CR33
R6
4700
TO LOC
AMPL
DRIVER
AMPL
Q9
R39
1K
CR41
CR11
P1-27
J1-27
P3
BP-34
+27.5 VDC
VOR/LOC
PWR IN
7
6
5
2
1
K1
CR10
1N3032A
+33V
B
R40
4700
C7
47
C16
47
C57
.22
90/150
CPS
INPUT
R29
CR8
Q4
R30
CR9
R41
1500
C25
R31
R32
344F-1
VAR 30 CPS
AMPL
Q21
2N2386
CR1
CR24
GS/LOC
ENERGIZE
P2-2
J1-2
CR23
C60
1
NAV DISABLE
(GRD)
J1-3
P2-3
CR22
R21
1500
400 CPS
FROM
SYN B3
CR2
TO BEARING
SERVO AMPL
C56
1
R22
39K
+16V

Localizer Control Circuits, Simplified Schematic Diagram
Figure 33

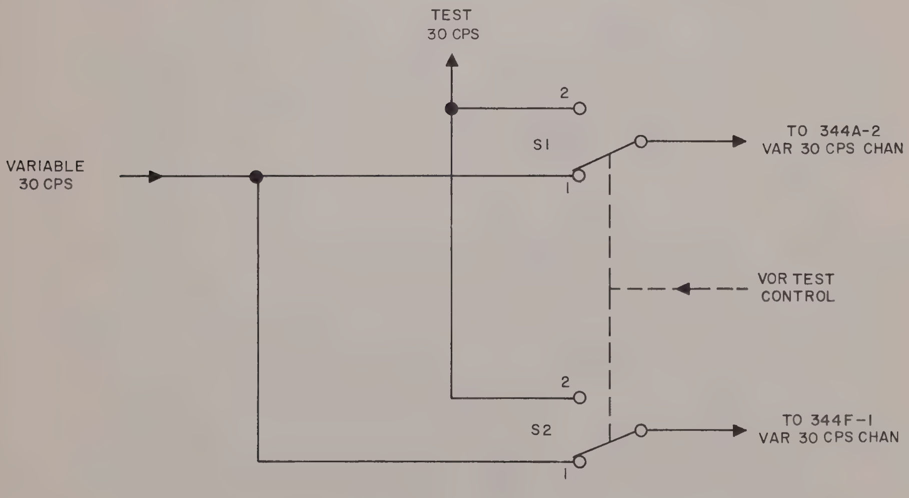
Also on localizer operation a ground is applied through P2-2, J1-2 to the cathode of CR23 in the 344F-1. The ground is applied through CR24 to the source of amplifier Q21, which uses a field effect transistor, to disable the stage.

Diode CR2 is also forward biased and provides a path to couple a 400-cps signal from synchro B3 to the bearing servo amplifier. This signal, after amplification, drives the bearing mechanism motor to position the RMI pointer in a horizontal position pointing to the right (3 o'clock). When a ground is applied at P2-3 for the navigation disable function, CR22 is forward biased to provide same circuit control as above.

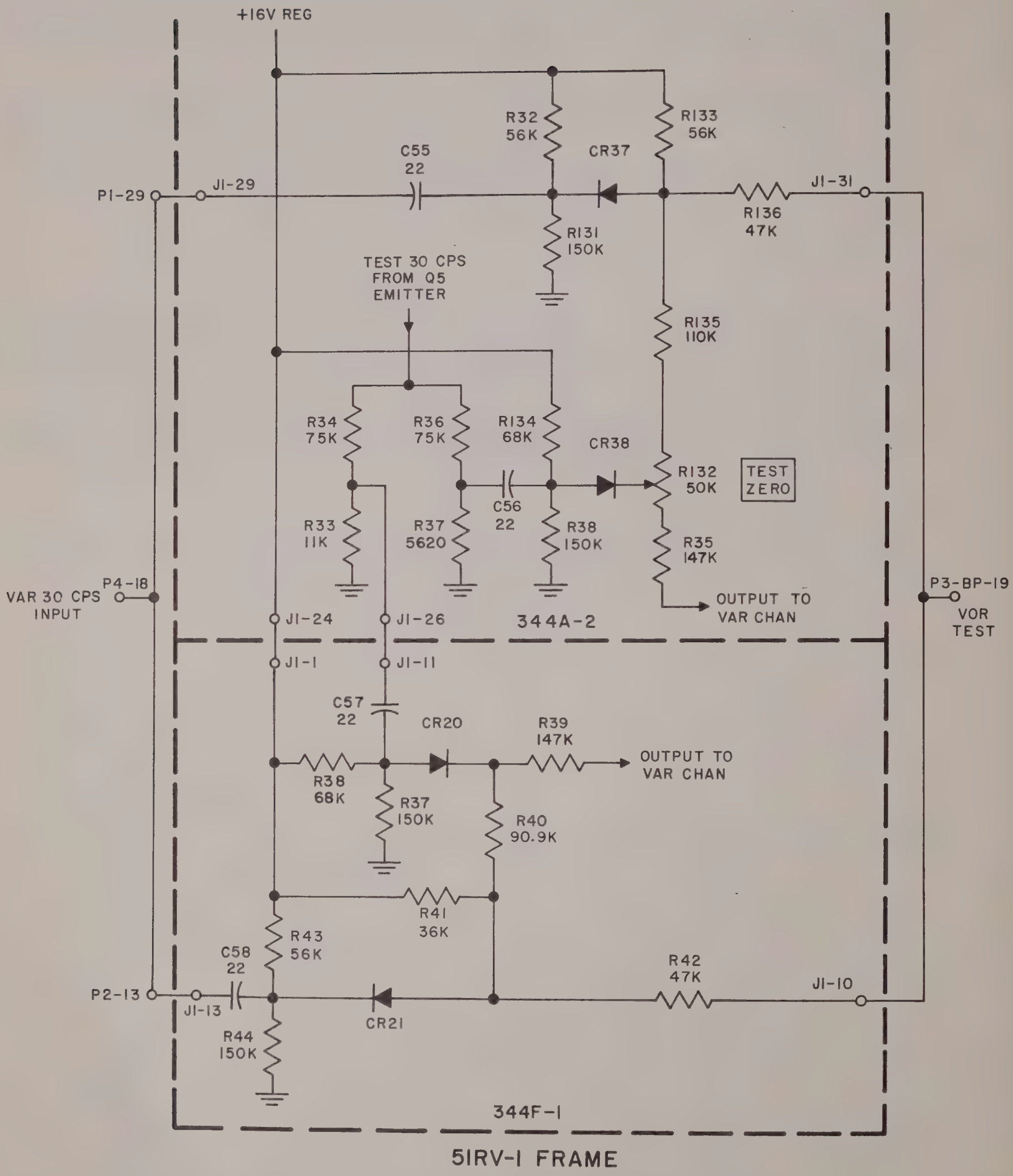
(3) VOR Test Circuitry.

The input switching circuits in the 344A-2 and 344F-1 variable 30-cps channels couple one of two 30-cps signals to the variable channels. A simplified diagram of the switching circuits is shown in figure 34. During normal operation, the VOR variable 30-cps signal is coupled through position 1 of toggle switches S1 and S2 to the 344A-2 and 344F-1 variable 30-cps channels. When the VOR test control is activated, switches S1 and S2 are moved to position 2 and the test 30-cps signal is coupled to the variable 30-cps channels. The solid-state switches used in the 344A-2 and 344F-1 perform the same function as the toggle switches shown in figure 34.

Refer to the 344A-2 VOR test circuits in figure 35. During normal VOR operation, +16 volts is applied to the anode of CR37 and cathode of CR38. Voltage divider resistors R32



VOR Test Switching, Simplified Schematic Diagram
Figure 34


+16V REG
R32
56K
R133
56K
C55
22
CR37
P1-29
J1-29
J1-31
R136
47K
R131
150K
TEST 30 CPS
FROM Q5
EMITTER
R135
110K
R34
75K
R36
75K
R134
68K
CR38
R132
50K
TEST
ZERO
C56
22
R33
11K
R37
5620
R38
150K
R35
147K
VAR 30 CPS
INPUT
P4-18
OUTPUT TO
VAR CHAN
P3-BP-19
VOR
TEST
J1-24
J1-26
344A-2
J1-1
J1-11
C57
22
CR20
R39
147K
OUTPUT TO
VAR CHAN
R38
68K
R37
150K
R40
90.9K
R41
36K
R43
56K
C58
22
R42
47K
J1-10
P2-13
J1-13
CR21
R44
150K
344F-1
51RV-1 FRAME

VOR Test Circuits, Simplified Schematic Diagram
Figure 35

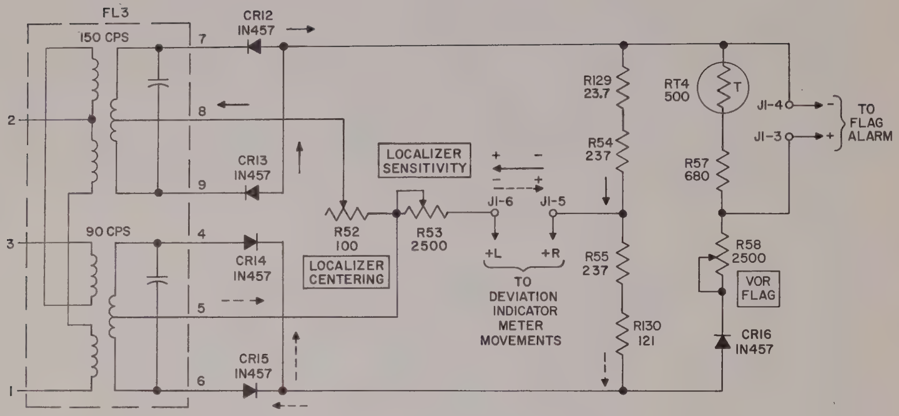
and R131 lower the 16 volts and apply approximately +12 volts on the cathode of CR37. A path for the variable 30-cps signals is then provided through C55, CR37, R135, R132, and R35 to the variable 30-cps channel. Voltage divider resistors R134 and R38 lower the 16 volts and apply approximately 12 volts on the anode of CR38. This reverse biases CR38 and opens the path for the test 30-cps signal. When the VOR test control is activated, a ground is applied through J1-31 and R136 to the anode of CR37 and cathode of CR38. Diode CR37 is reverse biased and opens the path for the variable 30-cps input. Diode CR38 is now forward biased and provides a path to couple the test 30-cps signal (from the Q5 emitter) to the variable 30-cps channel. Resistors R36 and R37 and capacitor C56 shift the test 30-cps signal the proper amount so the deviation needle is centered and the to-from indicator reading is FROM when the course is set to zero degrees.

The 344F-1 VOR test circuitry operates the same as that just discussed for the 344A-2. During normal VOR operation, CR20 is reverse biased, opening the path for the test 30-cps signal. Diode CR21 is forward biased and the variable 30-cps signal is coupled to the variable signal channel through C58, CR21, R40, and R39. When the VOR test control is activated, the ground applied at J1-10 (on 344F-1) reverse biases CR21 and forward biases CR20. The path for the variable 30-cps signal is open, and the test 30-cps signal is coupled to the variable signal channel through C57, CR20, and R39. The phase of the test 30-cps signal is determined by resistors R33 and R44 and capacitor C57 to allow the phase detector output to position the RMI pointer at 180 degrees.

(4) 344A-2 Circuit Theory.

(a) Localizer Operation.

The localizer 90- and 150-cps signals are coupled through the driver amplifier Q9 to output amplifiers Q10 and Q11 when the 51RV-1 is tuned to a localizer frequency (refer to paragraph G.(2)). LOCALIZER FLAG control R42 (Q9 collector) is adjusted to provide 375 microamperes flag alarm current with a standard localizer centering signal input to the 51X-4. The output of the push-pull amplifiers Q10 and Q11 (figure 814) is applied to filter FL3 which has two tuned secondaries, one resonant at 150 cps and the other resonant at 90 cps. Each audio signal is rectified by a full-wave rectifier (figure 36). The current resulting from the voltage developed by the 150-cps signal flows through R52, R53, and the deviation indicator to deflect the deviation needle to the left and produce a positive voltage at J1-6 (dotted arrows). Current resulting from the voltage developed across the 150-cps rectifiers, CR12 and CR13, flows through the deviation indicator in the direction shown by the solid arrows to deflect the deviation needle to the right and produce a positive voltage at J1-5. If the 150- and 90-cps signals are equal, zero voltage will be developed across the deviation indicator terminals and zero current will flow, centering the deviation needle. LOCALIZER CENTERING control R52 is adjusted to obtain zero microampere on the deviation indicator with a standard localizer centering signal input to the 51X-4. LOCALIZER SENSITIVITY control R53 is adjusted to obtain 90 microamperes deviation current for a standard localizer deviation signal input. Diode CR16 provides for nonlinear action of the flag alarm which helps to give safe flag operation. The flag will be visible when a trouble has developed in the ground or airborne equipment, indicating that further use of the facility is unreliable. Thermal resistor RT4 provides temperature compensation in the flag alarm circuit.

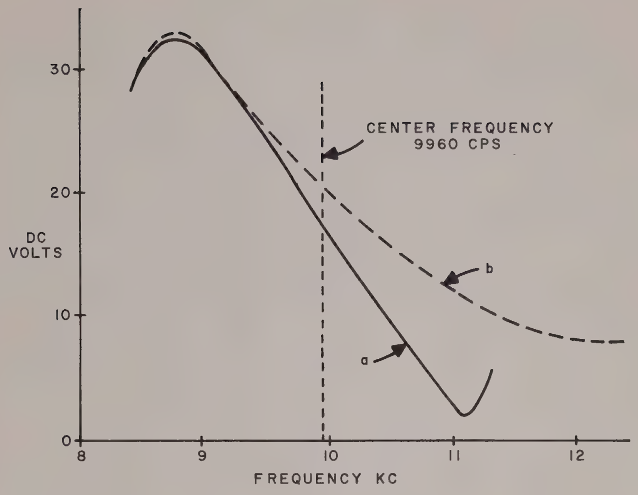

FL3
150 CPS
90 CPS
CR12
IN457
CR13
IN457
CR14
IN457
CR15
IN457
7
8
9
4
5
6
2
3
1
LOCALIZER SENSITIVITY
LOCALIZER CENTERING
R52
100
R53
2500
J1-6
J1-5
+L
+R
TO DEVIATION INDICATOR METER MOVEMENTS
R129
23.7
R54
237
R55
237
R130
121
RT4
500
T
R57
680
R58
2500
VOR FLAG
CR16
IN457
J1-4
J1-3
TO FLAG ALARM

Localizer Output Circuitry, Simplified Schematic Diagram
Figure 36

(b) Manual VOR Reference 30-CPS Channel.

1. 9960-CPS FM Stages. (Refer to figure 38.)

The 9960-cps subcarrier, which is frequency modulated with the reference 30-cps signal, is coupled from the 51X-4 VOR/LOC output through capacitor C1 to 9960-cps amplifier Q1. Capacitor C1 presents approximately 330 times more reactance to the variable 30-cps signal, which is also present at the 51X-4 VOR/LOC output, and attenuates most of it. Capacitor C4 and inductor L2 in the collector of Q1 provide a band pass for the 9960-cps signal and reduce noise from being coupled through the amplifiers. Limiters CR1 and CR2 clip positive and negative amplitude variations of the subcarrier. Capacitor C5 couples the signal to 9960-cps amplifier Q2 and keeps the d-c voltage from shorting to ground through CR1. The series LC circuit, inductor L1 and capacitor C7, in the Q2 collector attenuates 30-cps amplitude variations detected by limiters CR1 and CR2. Amplitude variations of the 9960-cps signal are further clipped by limiters CR3 and CR4. The square-wave output of the limiters is applied to the slope detector circuitry, including FL1, Q3, and FL2. The detector has a relatively high output voltage with a linear output centered around the input frequency of 9960 cps. The FM signal is developed across the frequency sensitive voltage divider consisting of R13 and FL1, and coupled to the base of transistor Q3. Filter FL1 is tuned to approximately 11,000 cps. The output of the transistor is transformer coupled in FL2 to a secondary circuit which is tuned to approximately 9240 cps. The tuning of FL1 and FL2 is selected so the desired center frequency (9960 cps) falls in the middle of the linear portion of the output curve. Curve a in figure 37 illustrates

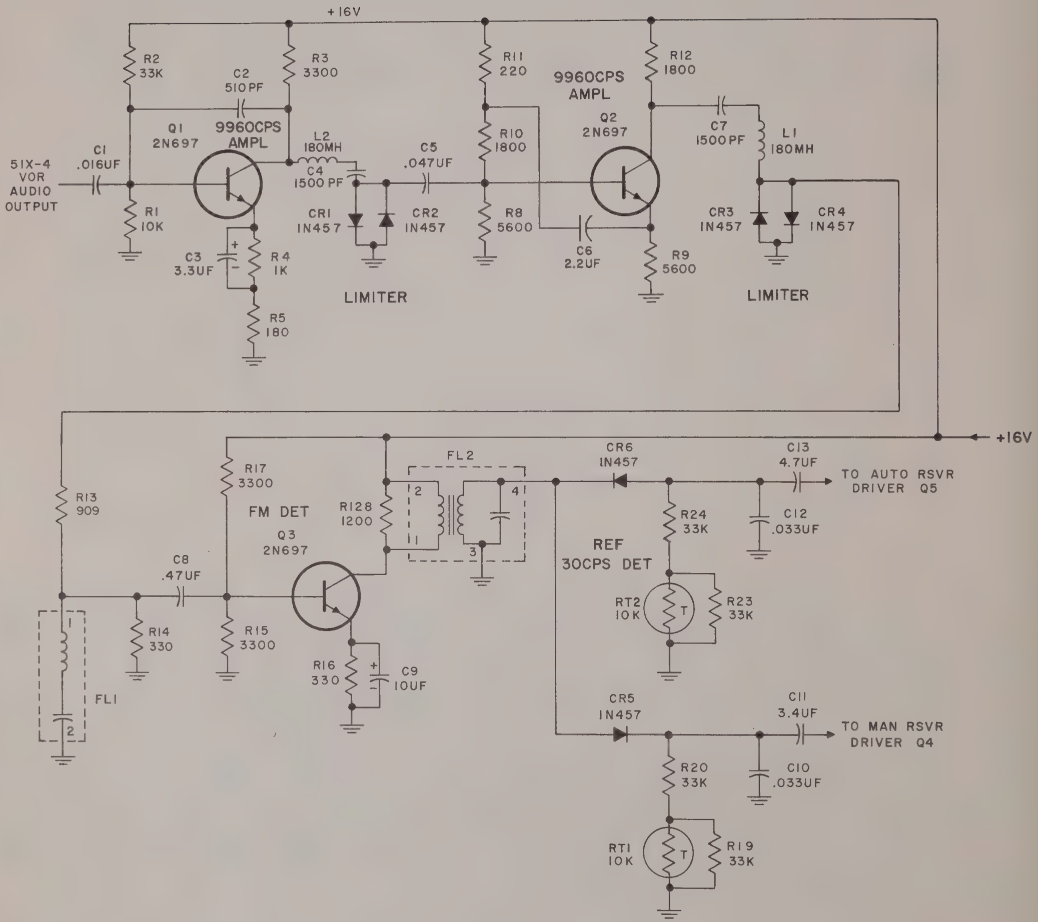


FM Detector Output Characteristic
Figure 37

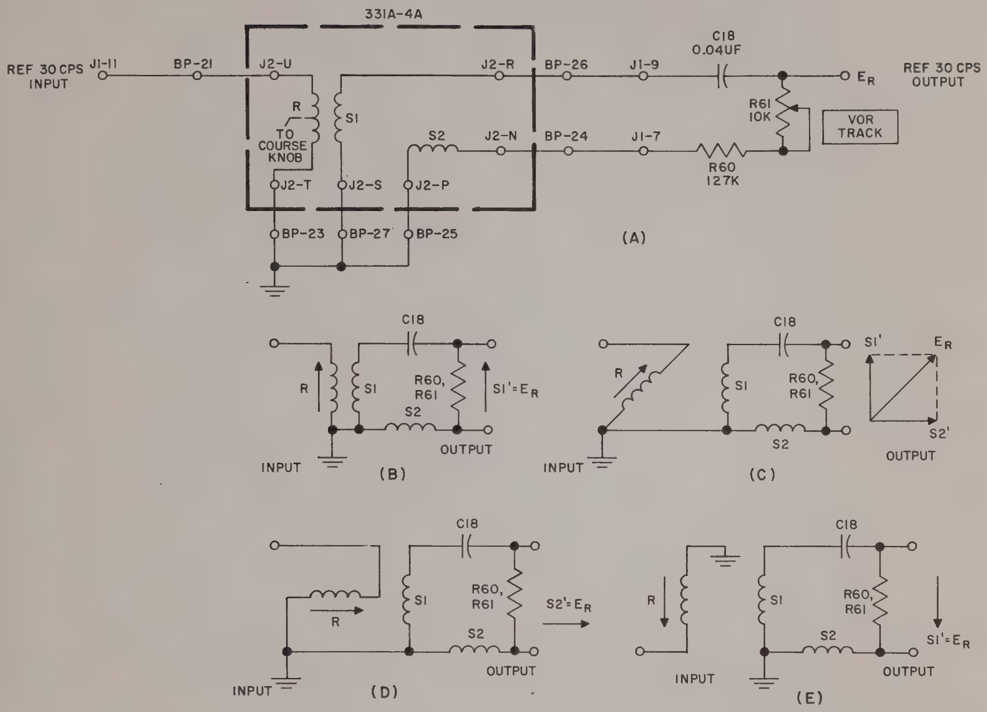
the frequency characteristic of the slope detector circuitry. Curve b represents the characteristic of an FM slope detector with no frequency conscious voltage divider in the input signal path, i.e., FL1. The transistor isolates the two tuned circuits so there is minimum cross interference and frequency variance. Diodes CR5 and CR6 detect the 30-cps signal amplitude variation, which is proportional to the rate the subcarrier varies between 9480 and 10,440 cps. The signal detected by CR5 is coupled to the manual resolver driver Q4, and that detected by CR6 is coupled to automatic resolver driver Q5. Since 30-cps outputs from CR5 and CR6 are 180 degrees out of phase, any 30-cps variations added in the B+ circuit by one driver are canceled by the 30-cps variations added by the other driver. The reference 30-cps output of Q4 is applied across the resolver rotor in the course indicator.

2. Manual VOR Reference Signal Phase Shifter.

The course indicator resolver and an RC circuit in the 344A-2 form a phase shifter as shown in figure 39(A). The resolver rotor is ganged to the course indicator course selector knob. The resolver rotor voltage is coupled to stators S1 and S2. The phase shifter output is the sum of the voltage across stator S1 and capacitor C18 (S1'), and the voltage across stator S2 and resistors R60 and R61 (S2'). Voltage S1' will lag voltage S2' by 90 degrees due to the capacitance in the stator S1 leg. The action of the resolver is explained as follows.


+16V
R2
33K
C2
510PF
R3
3300
R11
220
9960CPS
AMPL
R12
1800
Q1
2N697
9960CPS
AMPL
Q2
2N697
C7
1500PF
L1
180MH
51X-4
VOR
AUDIO
OUTPUT
C1
.016UF
L2
180MH
C4
1500 PF
C5
.047UF
R10
1800
R1
10K
CR1
1N457
CR2
1N457
R8
5600
C6
2.2UF
CR3
1N457
CR4
1N457
C3
3.3UF
R4
1K
R9
5600
R5
180
LIMITER
LIMITER
+16V
R17
3300
FL2
CR6
1N457
C13
4.7UF
TO AUTO RSVR
DRIVER Q5
R13
909
FM DET
Q3
2N697
R128
1200
R24
33K
C12
.033UF
REF
30CPS DET
C8
.47UF
RT2
10K
R23
33K
R14
330
R15
3300
R16
330
C9
10UF
FL1
CR5
1N457
C11
3.4UF
TO MAN RSVR
DRIVER Q4
R20
33K
C10
.033UF
RT1
10K
R19
33K

344A-2 9960-CPS FM Circuits, Simplified Schematic Diagram
Figure 38


331A-4A
REF 30 CPS INPUT
J1-11
BP-21
J2-U
R
TO COURSE KNOB
S1
S2
J2-R
J2-N
J2-T
J2-S
J2-P
BP-23
BP-27
BP-25
BP-26
BP-24
J1-9
J1-7
C18 0.04UF
E_R
REF 30 CPS OUTPUT
R61 10K
VOR TRACK
R60 127K
(A)
C18
R
S1
R60, R61
S2
S1'=E_R
INPUT
OUTPUT
(B)
C18
R
S1
R60, R61
S2
S1'
E_R
S2'
INPUT
OUTPUT
(C)
C18
S1
R60, R61
R
S2
S2'=E_R
INPUT
OUTPUT
(D)
C18
R
S1
R60, R61
S2
S1'=E_R
INPUT
OUTPUT
(E)

Manual VOR Reference 30-CPS Phase-Shifter, Simplified Schematic Diagram
Figure 39

When the rotor is in the position shown in figure 39(B), no voltage will be induced in stator S2. Therefore the output voltage E_R will be equal to S1'. The input and output voltages with the rotor turned 45 degrees clockwise are shown in figure 39(C). The voltage R will be induced equally across stators S1 and S2. Output voltage E_R is the sum of voltages S1' and S2', which are 90 degrees out of phase, and will be shifted 45 degrees from the output voltage shown in figure 39(B). When the rotor is rotated another 45 degrees (a total of 90 degrees), no voltage will be induced in stator S1 as shown in figure 39(D). Therefore, output voltage E_R will be equal to S2'. The output voltage has been shifted 90 degrees as a result of the rotor being rotated 90 degrees. The voltage developed across S1 will be 180 degrees out of phase in the stator when the rotor has been rotated 180 degrees from the position shown in figure 39(B).

No voltage is induced in stator S2, and therefore the output voltage E_R will equal S1' as shown in figure 39(E) and 180 degrees out of phase with the output in figure

39(B). The output voltage E_R is coupled in a low-pass filter in the reference 30-cps channel stages. VOR TRACK control R61 is adjusted to obtain zero-microampere deviation current for a bearing advanced 60 degrees from the bearing used when adjusting the manual VOR ZERO control R100.

3. Reference 30-CPS Stages. (Refer to figure 40.)

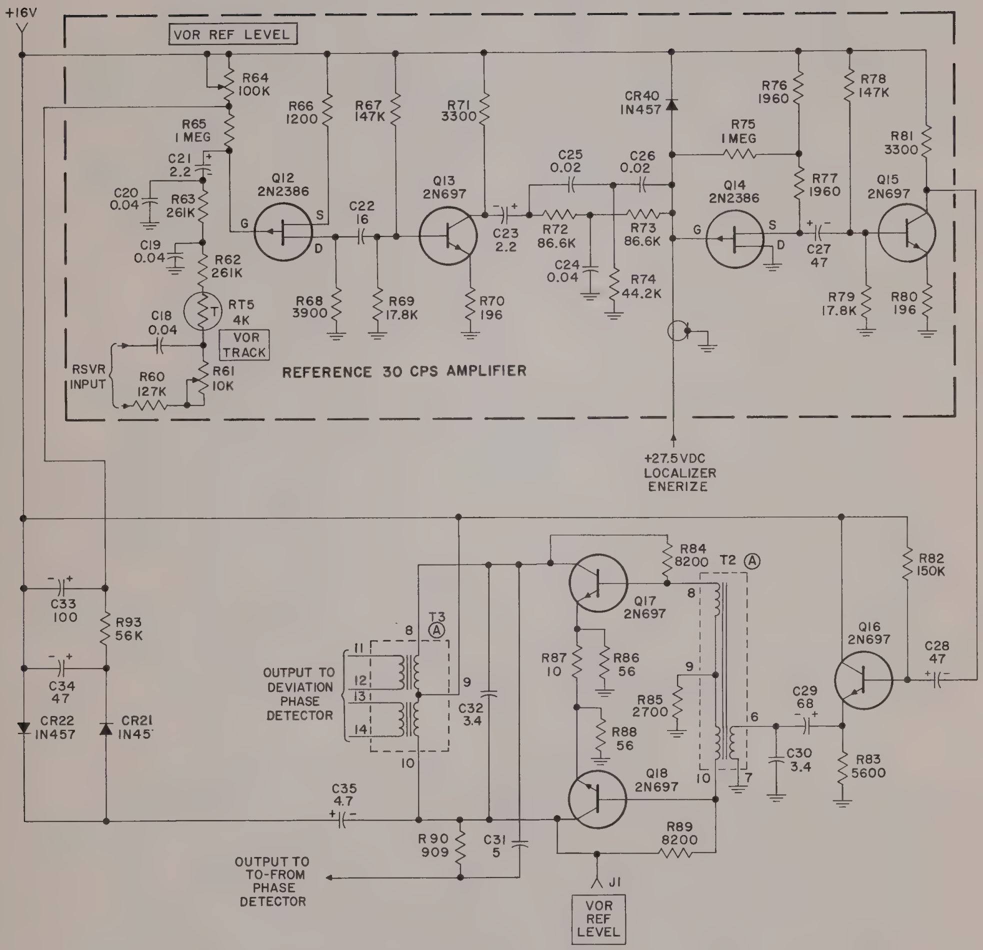
The 30 cps is coupled through low-pass filter R62, C19, R63, C20, and through C21 to the gate of field effect transistor Q12. The field effect transistor has a high-input impedance characteristic, matching the output impedance of the low-pass filter. The signal is then coupled through amplifier Q13 and a propeller modulation filter. The filter consists of C25, C26, R74, R72, R73, and C24 in a twin tee configuration. This filter attenuates harmonics of the 30-cps signal, providing maximum attenuation of the third harmonic. The signal is coupled to field effect transistor Q14. The output of Q14 is coupled through two amplifiers in cascade, Q15 and Q16, to push-pull amplifiers Q17 and Q18. The output of the push-pull amplifiers is transformer coupled to the VOR phase detector, and coupled through phase-shifting network, C31 and R90, to the to-from phase detector. Capacitor C32 resonates the primary of T3A at 30 cps. The output of the push-pull amplifier is monitored at VOR REF LEVEL jack J1 and also coupled through C35 to voltage doubler CR21 and CR22. Plus 16 volts d-c is applied to the doubler as a reference voltage. The doubler output is filtered by resistor R93 and capacitors C33 and C34 and the d-c is applied to the gate of amplifier Q12 through R65. This circuit is called the compressor and operates similar to an agc circuit to keep the over-all gain of the 30-cps amplifiers constant. A total of 12 db of available gain can be controlled by the compressor. VOR REF LEVEL control R64 is adjusted to obtain 4.5 volts a-c at VOR REF LEVEL jack J1 for a standard VOR test signal input. The reference 30-cps channel is disabled for localizer operation by the application of +27.5 volts d-c to the gate of amplifier Q14.

4. Variable 30-CPS Stages. (Refer to figure 814.)

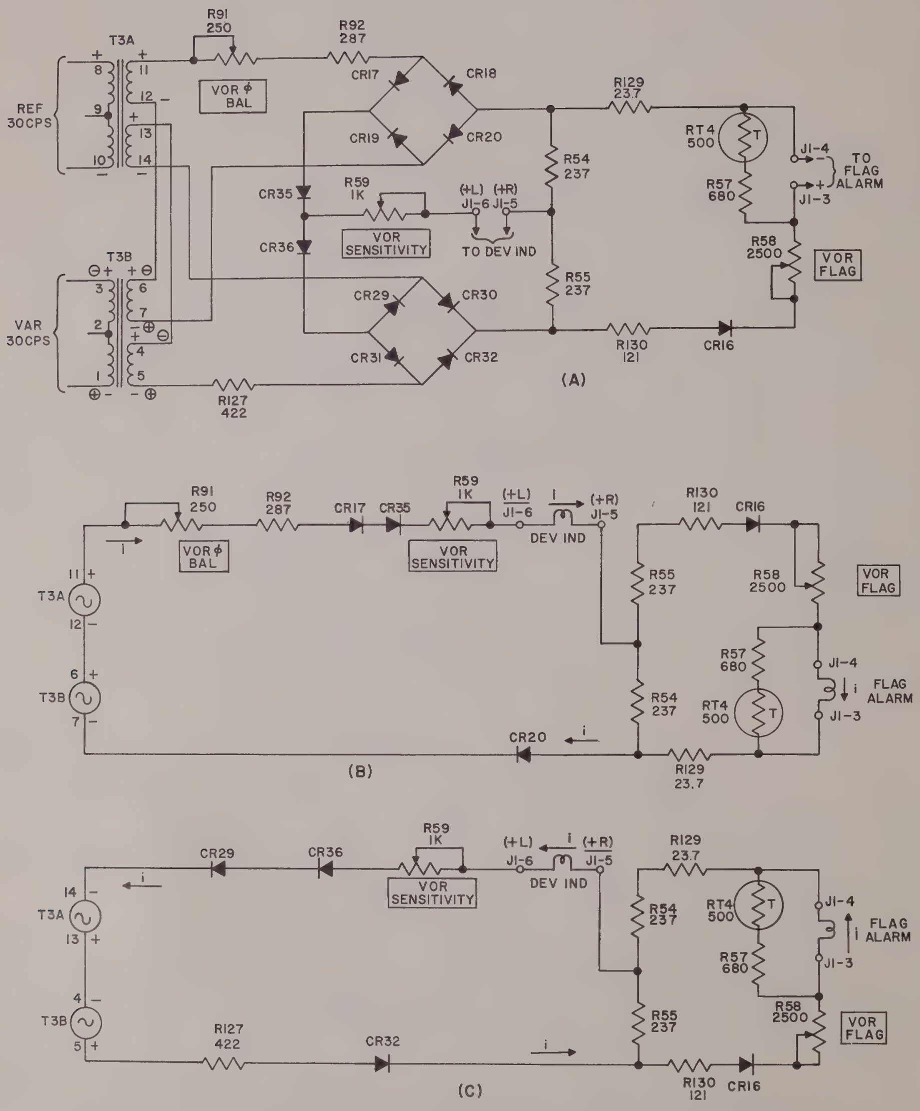
The variable 30-cps signal from the 51X-4 VOR/LOC AUDIO output is coupled through J1-29 and the VOR test circuit (figure 35) to a low-pass filter consisting of C41, R99, R100, and C42 at the input of the variable 30-cps amplifiers. Manual VOR zero adjustment R100 is adjusted to obtain zero-microampere deviation current for a standard VOR test signal input. VOR VAR LEVEL control R101 is adjusted to provide 4.5 volts a-c at VOR VAR LEVEL jack J2 for a standard VOR test signal input. It is coupled through the variable 30-cps stages, which are similar to those which followed the low-pass filter in the reference 30-cps channel, to the VOR and to-from phase detectors.

5. VOR Phase Detector.

VOR Ø BAL control R91 is set for the reciprocal course to obtain zero-microampere deviation current and is adjusted in conjunction with VOR ZERO adjustment R100. A simplified diagram of the VOR phase detector is shown in figure 41(A).


+16V
VOR REF LEVEL
R64 100K
R65 1 MEG
C21 2.2
C20 0.04
R63 261K
C19 0.04
R62 261K
RT5 4K
VOR TRACK
C18 0.04
RSVR INPUT
R60 127K
R61 10K
R66 1200
Q12 2N2386
G
S
D
C22 16
R67 147K
R68 3900
R69 17.8K
R71 3300
Q13 2N697
R70 196
C23 2.2
REFERENCE 30 CPS AMPLIFIER
C25 0.02
C26 0.02
R72 86.6K
R73 86.6K
C24 0.04
R74 44.2K
CR40 1N457
R76 1960
R75 1 MEG
R77 1960
Q14 2N2386
C27 47
R78 147K
R81 3300
Q15 2N697
R79 17.8K
R80 196
+27.5 VDC LOCALIZER ENERIZE
C33 100
R93 56K
C34 47
CR22 1N457
CR21 1N45
OUTPUT TO DEVIATION PHASE DETECTOR
T3 Ⓐ
8
9
10
11
12
13
14
C32 3.4
R84 8200
T2 Ⓐ
Q17 2N697
R87 10
R86 56
R85 2700
R88 56
Q18 2N697
6
7
R89 8200
R82 150K
Q16 2N697
C28 47
C29 68
C30 3.4
R83 5600
C35 4.7
R90 909
C31 5
OUTPUT TO TO-FROM PHASE DETECTOR
J1
VOR REF LEVEL

Reference 30-CPS Amplifier Stages, Simplified Schematic Diagram
Figure 40


R91
250
R92
287
T3A
REF
30CPS
VOR ϕ
BAL
CR17
CR18
CR19
CR20
R129
23.7
RT4
500
R57
680
R54
237
J1-4
J1-3
TO
FLAG
ALARM
CR35
CR36
R59
1K
VOR
SENSITIVITY
(+L) (+R)
J1-6 J1-5
TO DEV IND
R58
2500
VOR
FLAG
T3B
VAR
30CPS
CR29
CR30
CR31
CR32
R55
237
R130
121
CR16
R127
422
(A)
DEV IND
FLAG
ALARM
i
(B)
(C)

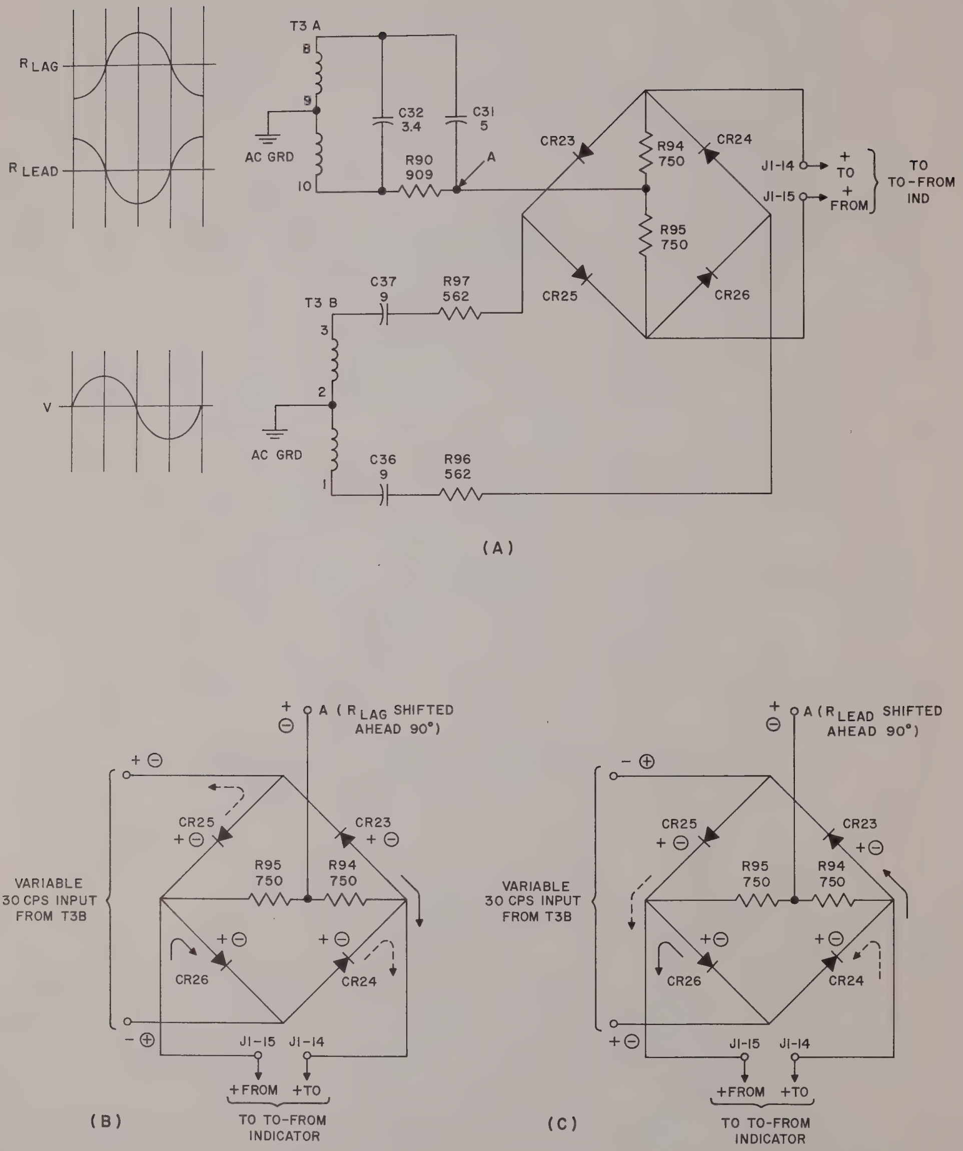
Manual VOR Phase Comparator, Simplified Schematic Diagram
Figure 41

When the reference and variable 30-cps signals are applied to the phase detector in phase, as shown by encircled polarities in figure 41(A), the polarities at primary terminals 8 and 1 of transformers T3A and T3B are identical. The voltages across windings T3A, 13-14 and T3B, 4-5 are series aiding and the voltages across windings T3A, 11-12 and T3B, 6-7 are series opposing. Current flow for this in-phase relationship, shown in figure 41(C), is through the deviation indicator in the direction to produce a right deflection and a positive polarity at J1-5. Diodes CR30 and CR31 conduct for the other alternation of the input a-c voltage. Note that current flows the same direction through the flag for any phase relationship of input voltage, but that the direction of current flow (and deflection) through the deviation indicator depends upon the phase relationship. When a signal of sufficient strength to reliably operate the VOR receiving system is present, enough voltage is applied to the flag movement to mask the flag. Loss of one or both 30-cps signals due to a failure in either ground or airborne equipment will reduce the current enough to allow the flag to appear. When the reference and variable 30-cps signals are 90 degrees out of phase, the voltage developed across T3A, 11-12 and T3B, 6-7 will be equal to the voltage developed across T3A, 13-14 and T3B, 4-5. Therefore, zero current will flow through the deviation needle movement, centering the needle. VOR FLAG control R58 is adjusted to obtain 300-microampere flag current for a standard VOR test signal. VOR SENSITIVITY control R59 is adjusted to obtain 150-microampere deviation current for a standard VOR test signal and the selected course set ten degrees from the bearing.

When the reference and variable 30-cps signals are applied to the phase detector 180 degrees out of phase, the polarities at T3A and T3B primary winding terminals 1 and 8 are opposite. The voltages in the secondary windings T3A, 11-12 and T3B, 6-7 will be series aiding, and the voltages in windings T3A, 13-14 and T3B, 4-5 will be series opposing. The current flow through the phase detector for this out-of-phase relationship of the reference and variable 30-cps is shown in figure 41(B). This current flow develops a voltage across the deviation indicator, terminals 5 and 6 (- to +), which causes the deviation needle to deflect to the left. The current also flows through CR16 to the flag alarm series-parallel circuit. Diodes CR19 and CR18 conduct for the other alternation of the input a-c voltage.

6. To-From Phase Detector.

A simplified schematic of the to-from phase detector is shown in figure 42(A). The sine waves shown at the input to transformers T3A and T3B are those which provide an output to center the deviation needle when compared in the VOR phase detector. The reference 30-cps signal (R) is shown lagging or leading the variable 30-cps signal (V). The variable 30-cps signal is coupled through capacitors C37 and C36 and resistors R97 and R96 to the bridge (diodes CR23 through CR26). The reference 30-cps signal is applied to the bridge after it has been shifted ahead 90 degrees by the phase shifting which includes R90 and C31. The reference signal R_{lag} will then be in phase with the variable signal in the to-from phase detector. The phase detector operation for this in-phase relationship is shown in figure 42(B). For the positive half cycle of the reference 30-cps signal (point A), diodes CR25 and CR24 are reverse biased and diodes CR23 and CR26 are forward biased. The variable 30-cps signal develops a voltage across the bridge to cause the current (solid arrow) to flow through CR23, the to-from indicator, and CR26.


R LAG
R LEAD
V
T3 A
8
9
10
AC GRD
C32
3.4
C31
5
R90
909
A
CR23
R94
750
CR24
J1-14
+
TO
J1-15
+
FROM
TO
TO-FROM
IND
R95
750
CR25
CR26
C37
9
R97
562
T3 B
3
2
1
AC GRD
C36
9
R96
562
(A)
+ ⊖ A (R LAG SHIFTED AHEAD 90°)
+ ⊖
CR25
+ ⊖
CR23
+ ⊖
VARIABLE 30 CPS INPUT FROM T3B
R95
750
R94
750
+ ⊖
+ ⊖
CR26
CR24
− ⊕
J1-15
J1-14
+FROM
+TO
(B)
TO TO-FROM INDICATOR
+ ⊖ A (R LEAD SHIFTED AHEAD 90°)
− ⊕
CR25
+ ⊖
CR23
+ ⊖
VARIABLE 30 CPS INPUT FROM T3B
R95
750
R94
750
+ ⊖
+ ⊖
CR26
CR24
+ ⊖
J1-15
J1-14
+FROM
+TO
(C)
TO TO-FROM INDICATOR

To-From Phase Detector, Simplified Schematic Diagram
Figure 42

This current flow deflects the to-from arrow to give a TO indication and produces a positive voltage at J1-14. For the negative half cycle of the reference 30-cps signal (encircled polarities), diodes CR25 and CR23 are forward biased. Current (dotted arrow) flows through the to-from indicator in the same direction, thus giving full-wave rectification.

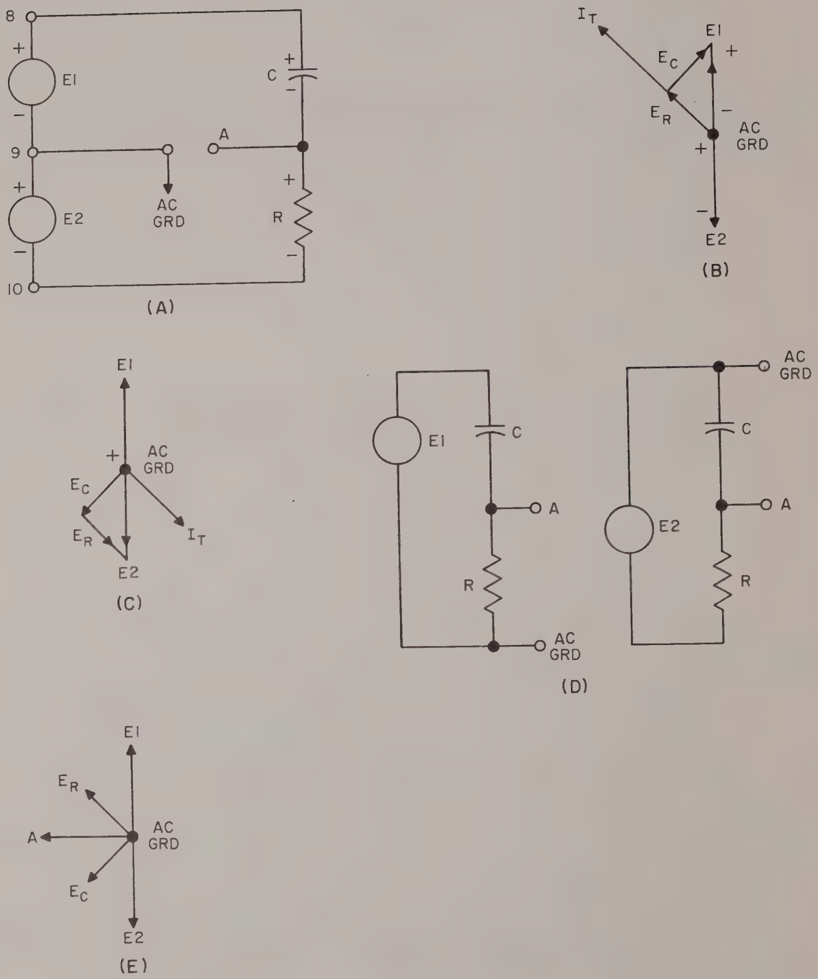
If the reference signal leads the variable signal by 90 degrees at the primaries of transformers T3A and T3B, the signals will be 180 degrees out of phase in the to-from phase detector. Operation of the phase detector for this phase relationship is shown in figure 42(C). For the positive half cycle of the reference 30-cps signal, diodes CR25 and CR24 are reverse biased and CR23 and CR26 are forward biased. The variable 30-cps signal current will flow through CR26, the to-from indicator, and CR23. This current flow deflects the to-from arrow in the direction to give a FROM indication and produces a positive voltage at J1-15. During the negative half cycle of the reference 30-cps signal, diodes CR25 and CR24 are forward biased and current will flow through the indicator to provide full-wave rectification.

The applied voltage for the phase-shifting network is obtained from the primary winding of transformer T3A. Refer to figure 43 for a simplified diagram of this network. Since the circuit is capacitive, and the reactance is equal to the resistance at 30 cps, the current leads the applied voltage by 45 degrees. With respect to pin 9, the voltages at pins 8 and 10 are 180 degrees out of phase. Figures 43(A) and 43(B) illustrate these two voltages as a-c sources E1 and E2. The voltage developed across R by E1 is in phase with the current and is shown vectorially in figure 43(B) as leading E1 by 45 degrees. The voltage across C lags E1 by 45 degrees and is shown closing the voltage loop. Figure 43(C) illustrates that the voltage developed across C by E2 lags E2 by 45 degrees. The voltage across R leads E2 by 45 degrees and is shown closing the voltage loop. Figure 43(D) is a simplified illustration showing the circuit first with E2 removed. The voltage between point A and a-c ground is developed across R by E1. Then in the circuit with E1 removed, the voltage between point A and a-c ground is developed across C by E2. The voltage vectors from details B and C are combined in figure 43(E) and show the two voltages developed between point A and a-c ground. The resultant of voltages E_R and E_C (between point A and a-c ground) is the output voltage of this network and is shown as leading the input voltage (E1 vector) by 90 degrees. Therefore, this network shifts the reference 30-cps signal ahead by 90 degrees. When the deviation indicator is centered, the reference and variable 30-cps signals are 90 degrees out of phase at the primaries of transformers T3A and T3B. After the reference 30-cps signal has been shifted ahead 90 degrees, the signals will be either in phase or 180 degrees out of phase with the variable 30-cps signals when applied to the to-from phase detector.

(5) 344F-1 Circuit Theory.

(a) General.

The reference and variable 30-cps signals are coupled from J1-4 and J1-13 (figure 818) through the two channels discussed in paragraphs (b) and (c) below. Components, through which the 30-cps signals are coupled, provide the required phase shift


8
+
E1
−
9
+
E2
−
10
AC
GRD
A
+
C
−
+
R
−
(A)
I_T
E1
E_C
+
E_R
−
AC
GRD
+
−
E2
(B)
E1
+
AC
GRD
E_C
E_R
I_T
E2
(C)
E1
C
A
R
AC
GRD
AC
GRD
C
A
E2
R
(D)
E1
E_R
A
AC
GRD
E_C
E2
(E)

To-From Reference Signal Phase Shifter, Simplified Schematic Diagram
Figure 43

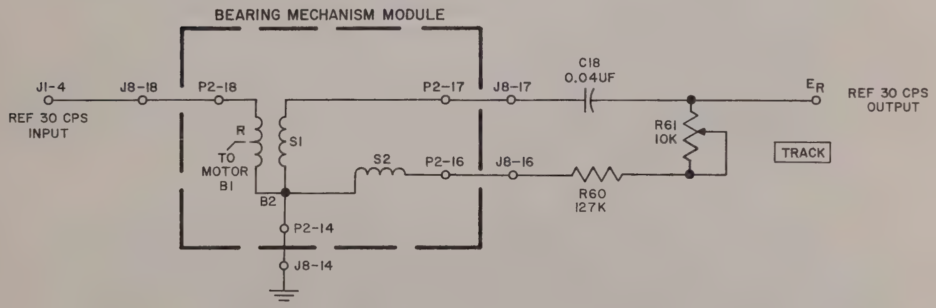
to obtain correct RMI indications. The correct RMI indication will be the bearing to the VOR station when the reference and variable 30-cps signals are at the proper quadrature relationship in the VOR phase detector. If the signals are of the improper 90-degree phase relationship, the phase detector output will be unstable and cause the motor to oscillate. This drives the signals farther from this quadrature relationship and provides an output to drive the motor and phase shifter until the detector output is zero, which stops the motor.

(b) Automatic VOR Reference 30-CPS Channel.

The output of resolver driver Q5 in the 344A-2 (figure 814) is coupled through J1-26 and frame wiring to the bearing mechanism module through J1-4 and J8-18 on the 344F-1 (figure 818). Resolver B2 and the RC network, C18, R60, and R61, form a phase shifter which provides a means to shift the phase of the reference 30-cps signal (figure 44). The phase shifter functions the same as that in the 344A-2 manual VOR reference channel as discussed in paragraph (4)(b). The rotor of the resolver, however, is turned by a two-phase motor, B1, in the bearing mechanism module. TRACK control R61 is adjusted to obtain the correct RMI indication for the bearing which is advanced 60 degrees from that selected to adjust the ZERO control R100. The reference 30-cps signal is then coupled through low-pass filter (R62, R63, C19, C20) and coupling capacitor C21 to the gate of field effect transistor Q12. REF LEVEL control R64 is adjusted to obtain 4.5 volts a-c at REF LEVEL jack J3 for a standard VOR test signal input. The reference 30-cps channel amplifiers are identical to those following the manual VOR reference signal phase shifter in the 344A-2. Refer to paragraph (4)(b). The reference 30-cps signal is coupled through transformer T3(A) to the VOR phase detector.

(c) Automatic VOR Variable 30-CPS Channel. (Refer to figure 818.)

The 51X-4 variable 30-cps signal output is coupled through J1-13, C58, and CR21 (when the VOR test control is not activated) to the variable 30-cps channel. VAR



Automatic VOR Reference 30-CPS Phase Shifter, Schematic Diagram
Figure 44

LEVEL control R101 is adjusted to obtain 4.5 volts a-c at VAR LEVEL jack J4 for a standard VOR test signal input. ZERO control R100 is adjusted to obtain an RMI indication equal to the VOR BEARING. The variable channel circuitry is identical to that in the 344A-2 manual VOR variable channel. The variable 30-cps signal is coupled through transformer T3B to the VOR phase detector.

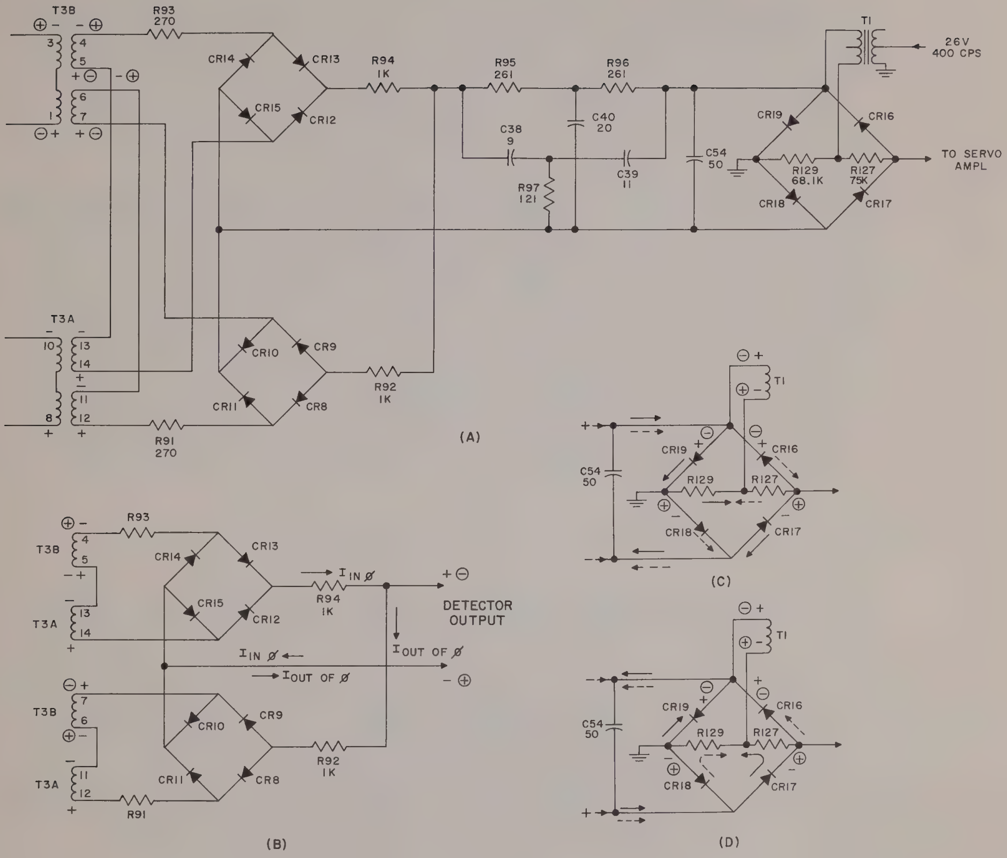
(d) Automatic VOR Phase Detector.

The automatic VOR phase detector consists of the secondary windings of transformers T3A and T3B and diodes CR8 through CR15 (figure 45(A)). This phase detector circuit produces an error output voltage proportional to the phase difference between the reference and variable 30-cps signals. If the phase difference is 90 degrees, the output is zero volt. The error voltage is filtered by the twin-T ripple filter to reduce the second harmonic content produced by the full-wave rectifier. This filtered d-c output voltage is then converted to a-c by the chopper, which is the detector load.

The detector operation will be illustrated by showing its input signals applied in phase and 180 degrees out of phase. If the reference and variable 30-cps signals are in phase (negative at T3A-10 and T3B-3), the voltages in windings T3A, 13-14 and T3B, 4-5 will be series aiding and the voltages in windings T3A, 11-12 and T3B, 6-7 will be series opposing. Refer to figure 45(B). A voltage will be applied across the diode bridge, CR12-CR15. Current I_{in} Ø will flow through the load to develop a positive output voltage. If the reference and variable 30-cps signals are 180 degrees out of phase, the voltages across secondary windings T3B, 6-7 and T3A, 11-12 will be series aiding. A voltage will be applied across diode bridge CR8-CR11. Current I_{out} of Ø will flow through the load to develop a negative output voltage. When the signals are 90 degrees out of phase, the detector output will be zero because the voltages across the two bridges will be equal and opposite in polarity.

When the polarity of the 26-volt, 400-cps voltage is in phase with the phase detector output (signals in phase), as shown in figure 45(C), diodes CR17 and CR19 are forward biased. These diodes conduct to form a path for the phase detector output current through R127 and R129. The chopper output will be positive. When the polarity of the 400-cps voltage reverses (encircled polarities), diodes CR16 and CR18 will conduct to provide a path for the phase detector output current developing a voltage across loads R127 and R129 to produce a negative output. Thus, for an in-phase relationship when the phase detector output is positive, the chopper output will be in phase with the 400-cps voltage.

If the phase detector output (signals out of phase) is negative, the chopper output will be out of phase with the 400-cps voltage. Diodes CR17 and CR19 will provide a path for the phase detector output current with the 400-cps voltage at the polarity shown in figure 44(D). The chopper output is negative and thus out of phase with the 400-cps voltage. Phase detector current will flow through CR16 AND CR18 and through R127 and R129 to produce a positive output when the 400-cps voltage reverses polarity (encircled polarities). The chopper output is then coupled to the bearing servo amplifier.


T3B
R93
270
CR14
CR13
R94
1K
R95
261
R96
261
T1
26V
400 CPS
CR15
CR12
C38
9
C40
20
C54
50
C39
11
R97
121
CR19
CR16
R129
68.1K
R127
75K
CR18
CR17
TO SERVO
AMPL
T3A
CR10
CR9
CR11
CR8
R92
1K
R91
270
(A)
I IN Ø
DETECTOR
OUTPUT
I OUT OF Ø
(B)
(C)
(D)

Automatic VOR Phase Detector, Simplified Schematic Diagram
Figure 45

(e) Bearing Servo Amplifier. (Refer to figure 818.)

The chopper output is coupled through C1 to the base of amplifier Q1 in the bearing servo amplifier module. Refer to figure 818. The transistor is used in common emitter configuration. Resistor R6 acts as an emitter swamping resistor to bias stabilize the transistor. The remainder of the emitter resistance, R7, is bypassed by C2 to place the emitter (and swamping resistor) at a-c ground. Resistors R3, R4, and R5 place the proper operating bias on the transistor. The signal is coupled to the phase inverter, Q2 and Q3. Transistor Q2 operates as a conventional grounded emitter amplifier, except that the emitter is grounded through the parallel resistance of R11 and the emitter-base resistance of transistor Q3. The Q3 emitter-base path has a low resistance, and most of the Q2 emitter a-c current flows through this path. Therefore, since transistor Q2 and Q3 emitter currents are nearly equal, the collector currents are nearly equal. The phase inverter, Q2 and Q3, couples a balanced current input signal through transformer T4 to push-pull amplifiers Q4 and Q5.

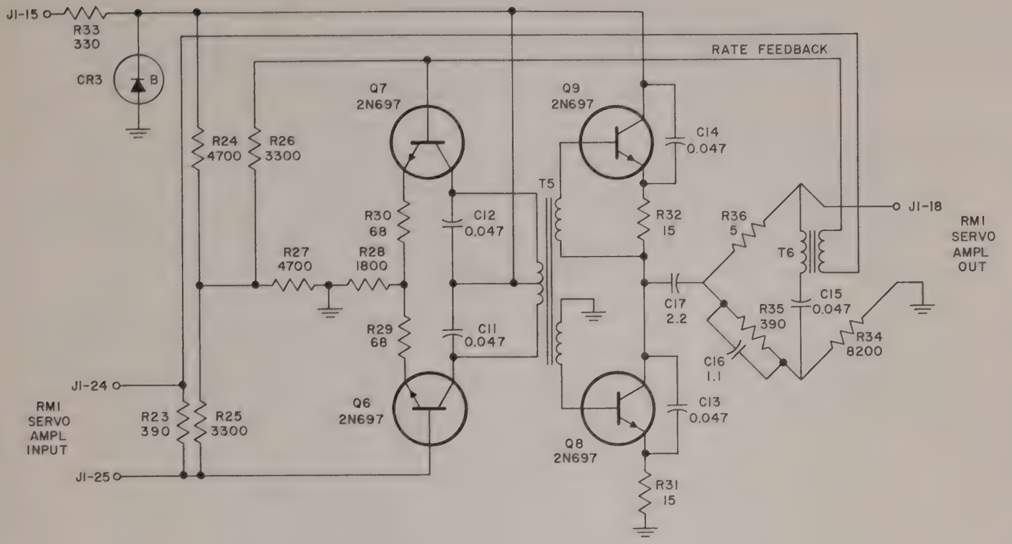
The output amplifier, Q4 and Q5, is a conventional class B, push-pull amplifier used in a common collector configuration. Junction diode CR1 is used for compensation of emitter-base junction resistance changes in Q4 and Q5 due to temperature variations. The motor is mechanically coupled to a rate feedback generator which feeds a voltage proportional to the speed of the motor to the servo amplifier input. This voltage, which is 180 degrees out of phase with the chopper output, is controlled by the setting of RATE control R2. RATE control R2 is adjusted so the RMI needle only has one overshoot when the bearing is changed with a standard VOR test signal input. Due to the inertia of the motor armature, the motor will tend to overshoot the null position. With the error voltage (chopper output) decreasing and close to zero volt, the feedback voltage will be largely due to motor inertia and will attempt to turn the motor in the reverse direction. Therefore, the rate feedback voltage acts as a brake to stop the motor before it overshoots.

(f) Bearing Mechanism Module. (Refer to figure 818.)

Motor-generator B1 has 26 volts, 400 cps applied to one winding and is driven by the amplified chopper voltage (output of bearing servo amplifier) which is applied to the motor winding. The motor drives the rotors of resolver B2 and differential synchro B3. As the rotor of resolver B2 is turned, the phase of the reference 30 cps is shifted. When it is shifted so it is in quadrature (90 degrees out of phase) with the variable 30 cps in the phase detector, the detector output and thus the chopper output will be zero volt. The motor-generator will stop, positioning the rotor of synchro differential B3 to transmit a voltage to the RMI needle synchro and position the needle at the bearing to the VOR station. If the variable and reference 30-cps signals are at the incorrect quadrature relationship, the detector output will be unstable and drive the motor until the correct relationship is obtained.

(g) RMI Servo Amplifier. (Refer to figure 46.)

The input signal for the RMI servoamplifier is coupled through pins 24 and 25 of J1 to the base of driver amplifier Q6. The output of Q6 is coupled to amplifier-switches Q8 and Q9 through transformer T5. The primary of T5 is tuned to approximately 400 cps. When the signal in the secondary of T5 is such that the base of Q9 is positive, Q9 will be turned on and the voltage at point A will be close to 27.5 volts. During the reversal of polarity of the input signal, the base of Q8 will be positive, turning Q8 on. The voltage at point A will then be close to ground potential. The voltage between point A and ground, therefore is an alternating voltage with a frequency equal to the frequency of the input signal. The output of the RMI servo amplifier is applied to one of the two windings of the RMI motor through C17, a bridge circuit which provides a negative feedback voltage approximately proportional to the speed of the servo motor, and J1-18. This negative (rate) feedback allows the amplifier to be sensitive around


J1-15
R33
330
CR3
B
RATE FEEDBACK
Q7
2N697
Q9
2N697
R24
4700
R26
3300
C14
0.047
T5
R30
68
C12
0.047
R32
15
R36
5
J1-18
RMI
SERVO
AMPL
OUT
R27
4700
R28
1800
T6
C15
0.047
C17
2.2
R35
390
R29
68
C11
0.047
R34
8200
C16
1.1
J1-24
RMI
SERVO
AMPL
INPUT
R23
390
R25
3300
Q6
2N697
C13
0.047
Q8
2N697
J1-25
R31
15

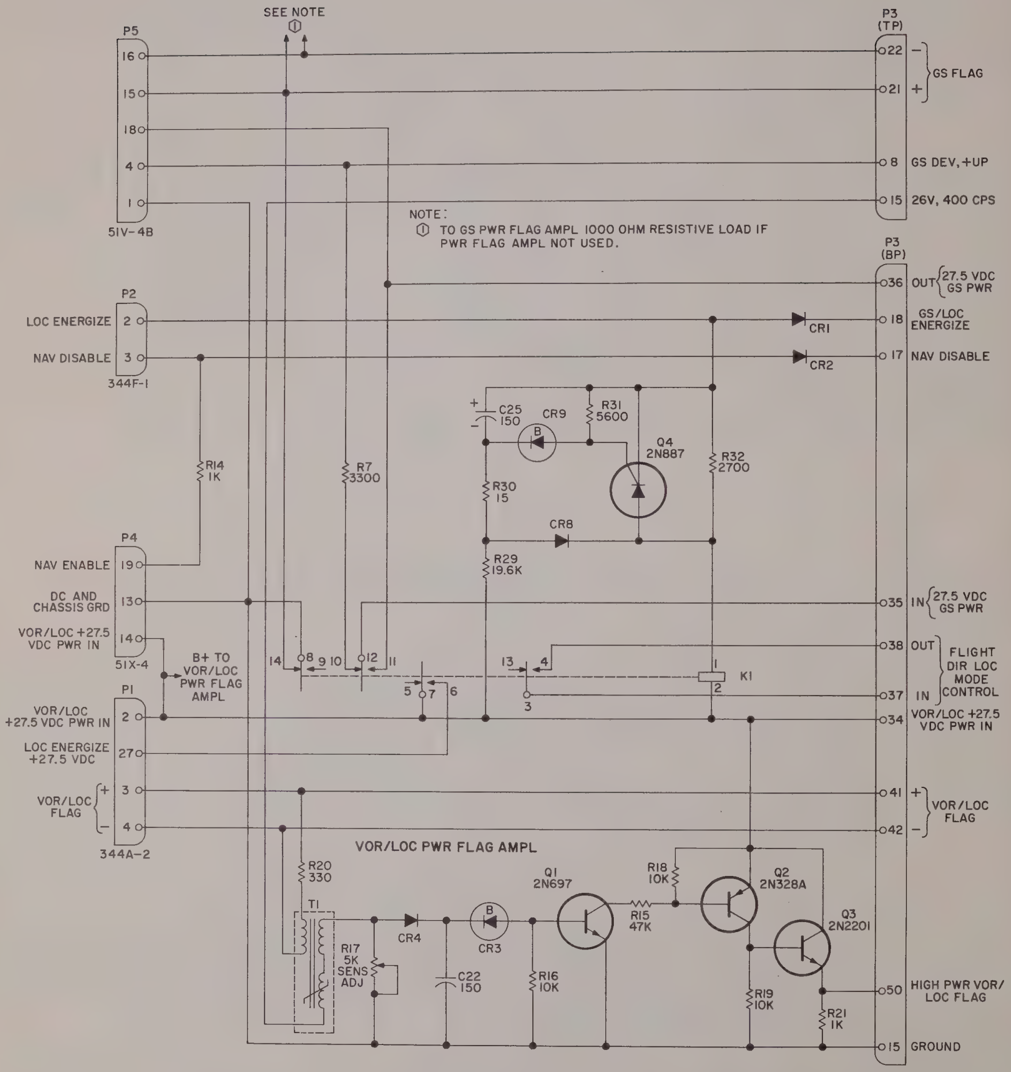
RMI Servo Amplifier, Simplified Schematic Diagram
Figure 46

the null position and yet nonoscillatory. With the motor stopped, the rate feedback bridge circuit is designed so that the voltage across R35 and C16 lags that across R36 by the same amount that the voltage across the motor winding (RMI output) leads that across R34. When the motor is turning due to an error signal at the servo amplifier output, a back emf is developed in the motor winding proportional to the speed of the motor. The back emf unbalances the bridge, producing a voltage which is fed back to the input of the amplifier (Q7 base) through transformer T6. As the motor approaches the null position, the error signal becomes small, and motor speed is reduced; therefore, less negative feedback voltage is developed, and the gain of the amplifier is increased in the sense that a smaller feedback signal results in a large error signal at the input. If the motor continues to turn due to armature inertia, at a position very near the null, the magnitude of the feedback voltage exceeds that of the input error voltage. The feedback signal, when amplified, attempts to rotate the motor in the opposite direction. The feedback signal then acts as a brake bringing the motor to a halt at the null.

H. 51RV-1 Frame Circuit Theory. (Refer to figure 47.)

(1) Power Circuits.

The VOR/LOC +27.5-volt power input is applied at P3-34 of the 51RV-1 rear connector bottom plug. The 27.5-volt glide slope power is applied at P3-35 (bottom plug).


SEE NOTE
①
P5
16
15
18
4
1
51V-4B
P3
(TP)
22
21
8
15
−
+
GS FLAG
GS DEV, +UP
26V, 400 CPS
NOTE:
① TO GS PWR FLAG AMPL 1000 OHM RESISTIVE LOAD IF PWR FLAG AMPL NOT USED.
P3
(BP)
36
OUT
27.5 VDC GS PWR
P2
LOC ENERGIZE
2
NAV DISABLE
3
344F-1
CR1
18
GS/LOC ENERGIZE
CR2
17
NAV DISABLE
C25
150
CR9
B
R31
5600
Q4
2N887
R32
2700
R14
1K
R7
3300
R30
15
CR8
R29
19.6K
P4
NAV ENABLE
19
DC AND CHASSIS GRD
13
VOR/LOC +27.5 VDC PWR IN
14
51X-4
35
IN
27.5 VDC GS PWR
38
OUT
FLIGHT DIR LOC MODE CONTROL
37
IN
B+ TO VOR/LOC PWR FLAG AMPL
14
8
9
10
12
11
13
4
1
K1
2
5
7
6
3
P1
VOR/LOC +27.5 VDC PWR IN
2
LOC ENERGIZE +27.5 VDC
27
VOR/LOC FLAG
+
3
−
4
344A-2
34
VOR/LOC +27.5 VDC PWR IN
41
+
42
−
VOR/LOC FLAG
VOR/LOC PWR FLAG AMPL
R20
330
T1
R17
5K
SENS ADJ
CR4
C22
150
CR3
B
R16
10K
Q1
2N697
R18
10K
R15
47K
Q2
2N328A
Q3
2N2201
R19
10K
R21
1K
50
HIGH PWR VOR/ LOC FLAG
15
GROUND

51RV-1 Frame Power Circuits, Simplified Schematic Diagram
Figure 47

When the 51RV-1 is tuned to a VOR frequency, +27.5 volts is applied to the 344A-2 through P2-2 and to the 51X-4 through P4-14. The +27.5-volt glide slope power is also applied through contacts 12 and 10 of relay K1 and resistor R7 to P3-8 and P5-4 to deflect the glide slope deviation needle up. The glide slope flag negative terminals P3-22 and P5-16 are grounded through contacts 14 and 8 of relay K1.

When the 51RV-1 is tuned to a localizer frequency, a ground is applied through P3-18 and CR1 to a delay circuit consisting of R32, Q4, CR9, R31, C25, and R29. A ground is applied through CR1 and P1-2 to the 344F-1 circuitry. The voltage at the control electrode of silicon controlled rectifier (SCR) Q4 is zero and Q4 is cut off. Approximately two seconds after C25 begins to charge, the voltage across C25 reaches a value of 10 volts. This voltage causes CR9 to begin conducting. Current flows through R31 producing a positive voltage at the control electrode causing Q4 to conduct. Relay K1 is energized and applies +27.5 volts d-c to the localizer-energize circuitry of the 344A-2 through relay K1 contacts 7 and 6 and P1-27. The energized relay also removes the ground from the glide slope negative flag terminals and applies the +27.5-volt d-c glide slope power to the 51V-4B through relay K1 contacts 12 and 11 and P5-18 and to the power flag amplifier B+ circuits. The 27.5-volts d-c glide slope power is also applied to P3-36 through relay K1 contacts 12 and 11. Contacts 4 and 3 of relay K1 provide a connection for the flight director localizer mode control through P3-37 and P3-38.

(2) VOR/LOC Power Flag Amplifier.

The flag alarm voltage from the phase detector in the 344A-2 (across P2-3 and 4) is applied across the primary of saturable reactor T1. Resistor R20 and the primary winding of T1 provide a load of 1000 ohms across the flag alarm terminals. When the flag alarm current is low, the secondary of T1 provides a high impedance to the applied 26 volts, 400 cps. As the flag alarm current increases, the a-c impedance of the secondary decreases. The 26 volts, 400 cps is applied to detector CR4. The rectified voltage is coupled through breakdown diode CR3 to the base of Q1. Capacitor C22 and resistor R16 filter the rectified voltage. Transistors Q1, Q2, and Q3 are conventional d-c amplifiers and apply an output (approximately 250 milliamperes) to the power flag output.

The glide slope power flag amplifier operation is identical to the VOR/LOC power flag amplifier but uses saturable reactor T2 and transistors Q5, Q6, and Q7.

I. ILS Self-Test Circuitry. (Refer to figure 825.)

The ILS self-test circuitry consists of stable, phase-locked, 90- and 150-cps audio oscillators. The outputs of these oscillators are combined in suitable ratios and injected into the first audio stages of the localizer and glide slope receivers. The circuit is actuated by either of two pushbuttons on the 51RV-1 front panel or by a toggle switch on the cockpit control panel. When the UP/LEFT switch is actuated, a signal is fed into the ILS receiver circuitry to move the glide slope pointer up, the deviation pointer to the left, and the G.S. and VOR/LOC flags out of sight. The DOWN/RIGHT switch feeds a signal into the ILS circuitry that moves the glide slope pointer down, the deviation pointer to the right, and the G.S. and VOR/LOC flags out of sight.

When either switch is actuated, ground is applied through diode CR25 or CR26. The input power is supplied through diode CR30 and resistor R61 to Q8 and Q7. The output voltage is maintained at +16 volts by breakdown diodes CR28, CR27, and the emitter-base junction of Q7. The regulated power supply provides +16 volts to the ILS-Test stages. Transistor Q7 is biased to provide an emitter-base junction voltage of 1.0 volt and the breakdown diodes, CR28 and CR27, are each rated at 7.5 volts. If the output voltage increases due to a change in load, the forward bias on Q7 is increased. This occurs because the emitter voltage is held constant by CR28, and the base voltage increases because the voltage across CR27 is held constant. Emitter-collector current of transistor Q7 will increase through R60, increasing the voltage drop across R60 and decreasing the voltage applied to the base of Q8. The emitter-collector current of Q8 will decrease and lower the voltage drop across R58. The output is lowered because of the decrease in Q8 emitter-collector current and compensates for the increase in output voltage. Diode CR30 protects the circuit from negative input voltages. Capacitor C17 filters transients which may be present on the receiver B+ line.

The 450-cps master oscillator is used to synchronize the 90- and 150-cps oscillators. The master oscillator, consisting of transistors Q1 and Q2, is a free running multivibrator. Temperature compensating resistors RT1 and RT2 stabilize the circuit time constants. Variable resistor R7 is for fine frequency adjustment.

The output from the master oscillator are used to synchronize the 90- and 150-cps oscillators. The signal from the collector of Q1 is differentiated by C5 and R13 and fed through diodes CR5 and CR7 to the base of Q3. The signal from the collector of Q2 is differentiated by capacitor C10 and resistor R24 and fed through diodes CR10 and CR8 to the base of Q4. Transistors Q3 and Q4 are part of the 90-cps oscillator which is free running at 90-cps, but triggered by the differentiated pulses for better frequency stability. Just as the voltage on the base of Q3 or Q4 approaches the conduction level, a differentiated spike is coupled to the base and triggers the transistor into conduction. This keeps the 90-cps oscillator in phase with the 450-cps oscillator.

The output from the 450-cps oscillator synchronizes the 150-cps oscillator in the same manner. The signal from the collector of Q1 is differentiated by C11 and R27 and fed through diodes CR41 and CR30 to the base of Q5. The signal from the collector of Q2 is differentiated by C16 and R40 fed through diodes CR15 and CR13 to the base of Q6. The 150-cps oscillator is a free running multivibrator and it is triggered by the differentiated pulses for frequency stability.

Capacitor C7 and diode CR31 make up a sure-start circuit that prevents Q3 and Q4 from both saturating when the self-test circuit is first actuated. Transistor Q4 can conduct only if base current is supplied through R14, CR31, R16, R17, and CR8. When Q3 conducts the collector voltage of Q3 drops to zero. This stops the base current of Q4 causing it to turn off. During normal oscillations a square-wave voltage appears at the collector of Q4. This square wave is conducted through CR31 and filtered by C7 to provide a steady-state base supply for Q4. Capacitor C13 and diode CR32 operate the same as C7 and CR31, thus providing a steady-state base supply for Q6. The 90-cps signal from the collector of Q4 and the 150-cps signal from the collector of Q6 are combined in a diode switched resistive divider circuit.

When the UP/LEFT switch is actuated, ground is applied to the cathode of CR26, CR17, and CR19. Current flows through CR26 and relay K1. Relay K1 is energized and contacts 4, 7, 8, and 3 are closed. The 90-cps signal is developed across R48 and R1. The 150-cps signal is developed across R53, R51, R50, and R1. Both signals are developed across R2 with the 150-cps signal predominating. The output from the wiper arm of R2 is applied through contacts 8 and 3 of relay K1 to the localizer audio circuits.

The 90-cps signal is also developed across R47 and R4. The 150-cps signal is developed across R42, R44, R45 and R4. Both signals are developed across R5 with the 150-cps signal predominating. The output from the wiper arm of R5 is applied through contacts 4 and 7 of relay K1 to the glide slope audio circuits.

When the DOWN/RIGHT switch is actuated ground is applied to the cathode of CR25, CR18, and CR19. Current flows through CR25 and relay K1. Relay K1 is energized and contacts 4, 7, 8, and 3 are closed. The 90-cps signal is developed across R48, R50, R51, and R3. The 150-cps signal is developed across R53 and R3. Both signals are developed across R2 with the 90-cps signal predominating. The output from the wiper arm of R2 is applied through contacts 8 and 3 of relay K1 to the localizer audio circuits.

The 90-cps signal is also developed across R47, R45, R44, and R6. The 150-cps signal is developed across R42 and R6. Both signals are developed across R5 with the 90-cps signal predominating. The output from the wiper arm of R5 is applied through contacts 4 and 7 to the glide slope audio circuits.

The anode of CR23 is connected to J1 pin 10 of the 51V-4B Glide Slope Receiver and is at 9.4 volts d-c before either test switch is actuated. After either switch is actuated, a path for current flow through R55 and CR23 from pin 10 is provided. The voltage at pin 10 is lowered producing less forward bias on Q8 and increasing the agc voltage to a value high enough to cut off the i-f and r-f circuits in the glide slope receiver. With either switch actuated, ground is applied through CR21 and CR22 and CR24 to J1 pin 19 of the 51X-4 VOR/LOC Receiver. This grounds the collector of d-c amplifier Q7 in the 51X-4 and removes the power supply voltage from the i-f and r-f stages.

51RV-1 VOR/ILS Receiver - Disassembly

1. GENERAL.

This section contains instructions for removing components and parts from the 51RV-1. These instructions do not contain reference to routine procedures for unsoldering leads. Unsolder wires and leads only where necessary. Before disturbing connections, note color coding and placement of wires. Disassemble the 51RV-1 only as far as required to repair or replace a part. Do not disassemble the 51RV-1 as a routine part of the overhaul procedure.

2. DUST COVER REMOVAL. (Refer to figure 101.)

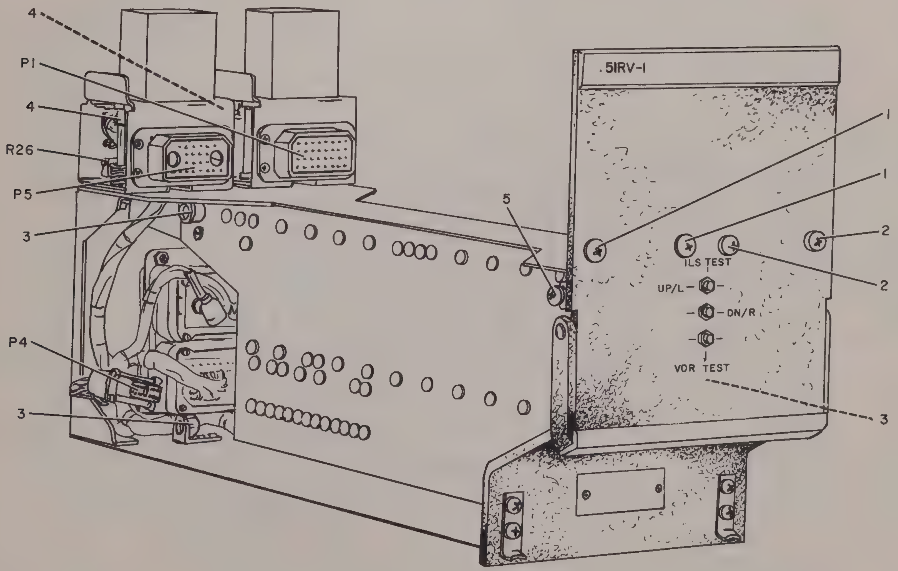
A. Loosen two screws (5), one on each side of front panel.

B. Turn the captive screw located on the rear of the 51RV-1 ccw until the chassis is free.

C. Slide the chassis out of the dust cover by pulling on the front handle while holding the dust cover.

3. 51V-4B Glide Slope Receiver Removal. (Refer to figure 101.)

A. Loosen captive screws (1) at the front of the 51RV-1.



51RV-1 Frame, Right-Side View
Figure 101

B. Loosen captive screws (4) in the connector assembly at the rear of the 51RV-1. (This assembly is the glide slope power flag unit in some models.)

C. Turn the 51V-4B chassis clockwise out of the 51RV-1 chassis, and remove it from connector P5.

4. 51X-4 VOR/LOC Receiver Removal. Refer to figure 101.

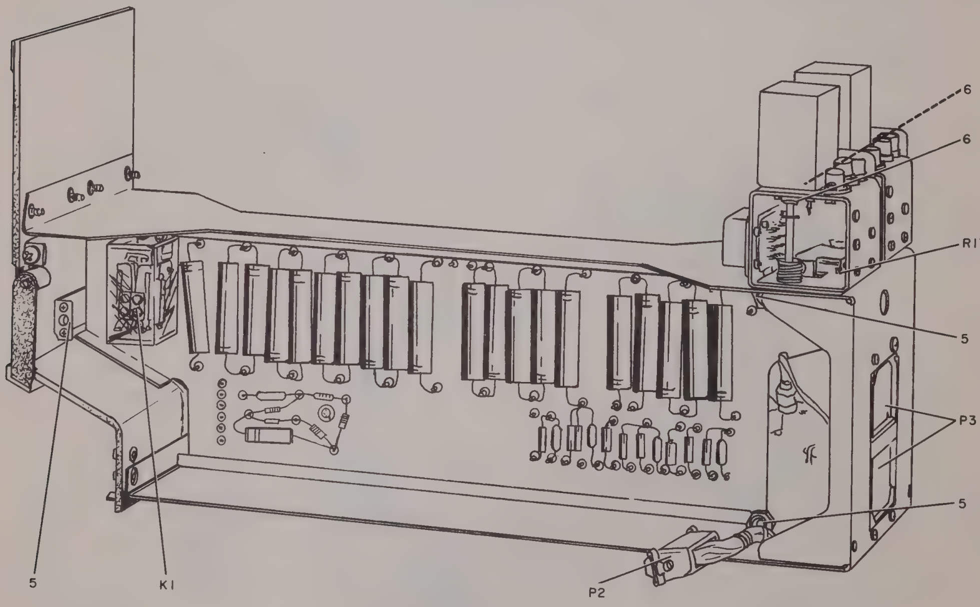
A. Loosen captive screws in the fixed nuts (3). Two are at the rear of the chassis and one is at the front.

B. Rotate the 51X-4 chassis clockwise, and loosen the two captive screws attaching chassis to connector P4.

5. 344A-2 Manual VOR/LOC Instrumentation Unit.

A. Loosen captive screws (2) at the front of the 51RV-1 (figure 101).

B. Loosen captive screws (6) in the connector assembly at the rear of the 51RV-1 (figure 102). (This assembly is the VOR/LOC power flag unit in some models.)



51RV-1 Frame, Left-Side View
Figure 102

C. Rotate the 344A-2 counterclockwise out of the 51RV-1 chassis, and remove the unit from connector P1 (figure 101).

6. 344F-1 Automatic VOR Instrumentation Unit Removal. Refer to figure 102.

A. Loosen captive screws in fixed nuts (5). Two are at the rear of the chassis and one is at the front.

B. Rotate the 344F-1 counterclockwise, and loosen the two screws attaching chassis to connector P2.

7. DISASSEMBLY OF 51V-4B GLIDE SLOPE RECEIVER.

A. Oscillator Subassembly Removal.

The oscillator subassembly (figure 702) should be removed when performing detailed trouble-shooting procedures, when replacing a component on the bottom of the subassembly, or when removing the 90/150-cps filter, FL3.

(1) Remove screw on subassembly cover, and remove this cover.

(2) Remove the three screws located near the corners of the subassembly.

(3) Carefully fold back the subassembly on the interconnecting wires to obtain access to the components on the bottom of the subassembly.

B. 90/150-CPS Filter FL3 Removal.

(1) Remove the oscillator subassembly as described in the preceding paragraph.

(2) Refer to the 51V-4B right-side view in figure 802 to locate filter FL3. Remove the two shakeproof nuts and two standoff posts that secure filter FL3 to the chassis, and lift the filter from the chassis.

C. Rear Connector Removal.

(1) Remove the four screws at the rear of the 51V-4B which secure the connector P1 to the chassis.

(2) Hold the connector inside its cover, and slide assembly forward and out the right side of the chassis (as viewed from the front of the 51V-4B).

D. R-F Subassembly Cover Removal.

The r-f subassembly cover (figure 702) must be removed for detailed trouble shooting and to replace components in the r-f input filter, the injection tripler and amplifier, the mixer, or the 30-mc i-f circuit.

(1) Remove the six screws from the r-f subassembly cover located on the top of the 51V-4B.

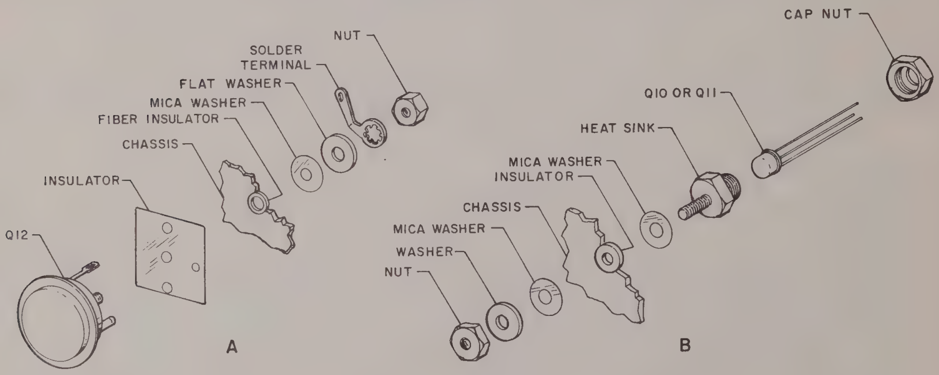
(2) Lift off the cover.

E. Transistor Removal.

(1) Remove series regulator transistor Q12 by first unsoldering the element leads and removing the nut, solder terminal, metal washer, and mica washer on the right side of the chassis; then slide the transistor out of its chassis mounting holes. Do not lose the spacing insulator. See figure 103A for mounting detail.

(2) Remove audio output transistors Q10 and Q11 by first removing the nut, metal washer, and fiber washer on the left side of the chassis. Unsolder the element leads (note location of element leads), and slide the heat sink, with transistor, out the right side of the chassis. Remove the cap nut to free transistor from the heat sink. See figure 103B for mounting detail.

(3) All other transistors are mounted in sockets and are removed by simply pulling them straight out of their sockets.


NUT
SOLDER TERMINAL
FLAT WASHER
MICA WASHER
FIBER INSULATOR
CHASSIS
INSULATOR
Q12
A
CAP NUT
Q10 OR Q11
HEAT SINK
MICA WASHER
INSULATOR
CHASSIS
MICA WASHER
WASHER
NUT
B

51RV-1 Transistor Mounting Diagrams
Figure 103

F. Rear Connector-Capacitor Removal.

The feedthrough capacitors at the rear of connector P1 (figure 104) are to be removed only if they are faulty or appear to be faulty.

(1) Remove the connector from the chassis (paragraph C), and lift the connector from the chassis to permit access to the capacitors. Unsolder and label the wires on the capacitor to be removed.

(2) Place the tip of a split-tip soldering iron (hollow tip iron may be used) over the capacitor at the base of the terminal.

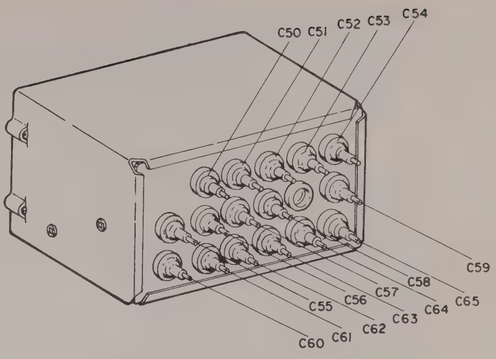
CAUTION: DO NOT OVERHEAT OR TOUCH ADJACENT CAPACITORS WITH IRON.

(3) When the solder is melted, remove the capacitor with a pair of long-nosed pliers.

8. DISASSEMBLY OF 51X-4 VOR/LOC RECEIVER.

A. Transistor Removal.

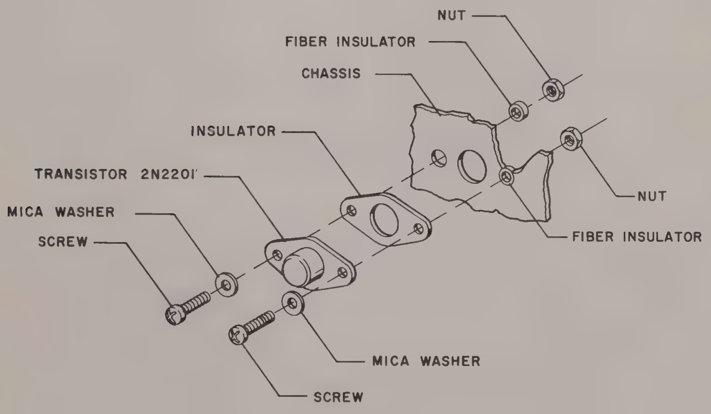
(1) Transistor Q9 (figure 105) is removed by first removing the four screws which hold the voltage regulator on the 51X-4 chassis. Unsolder element leads, remove the two screws and nuts. Lift transistor (2N2201), mica washers and insulators from the plate.


C50
C51
C52
C53
C54
C59
C58
C65
C57
C64
C56
C63
C55
C62
C61
C60

51V-4B Rear Connector Assembly Capacitors
Figure 104

(2) Transistor Q17 may be lifted from its heat sink, after unsoldering leads.

(3) The remaining transistors on the 51X-4 chassis are mounted in sockets and may be removed by simply pulling them straight out of their sockets.


NUT
FIBER INSULATOR
CHASSIS
INSULATOR
TRANSISTOR 2N2201
MICA WASHER
SCREW
NUT
FIBER INSULATOR
MICA WASHER
SCREW

Transistor 2N2201 Mounting Diagram
Figure 105

B. Subassembly Cover Removal.

(1) Access to the components in the vhf oscillator, 10-channel h-f oscillator, and 2-channel h-f oscillator subassemblies may be gained by removing the screw in each of the respective covers.

(2) Access to the components in the r-f subassembly may be gained by removing five screws in the subassembly cover.

9. DISASSEMBLY OF 344A-2 MANUAL VOR/LOC INSTRUMENTATION UNIT.

A. Adjustment Panel.

The adjustment panel (left side of chassis) may be freed by loosening three Phillips-head screws and folding the panel back on its hinges. This provides access to the components on the rear of the panel and on the chassis under the panel.

B. Transistor Removal.

(1) Transistors Q3, Q10, Q11, Q17, Q18, Q24, and Q25.

These 2N697 transistors are mounted in heat sinks which are shown disassembled in figure 103B. Remove these transistors by first removing the nut, metal washer, and fiber washer on the right side of the chassis. Unsolder the element leads (note location of the leads), and slide the heat sink, with transistor, out the left side of the chassis (fold back the adjustment panel to locate the transistor). Remove the cap nut to free transistor from the heat sink.

(2) Transistor Q8.

Refer to paragraph 8.A.(1) above for removal of the 2N2201 transistor.

(3) The remaining transistors on the 344A-2 chassis are mounted in sockets and may be removed by simply pulling them straight out of their sockets.

10. DISASSEMBLY OF 344F-1 AUTOMATIC VOR INSTRUMENTATION UNIT.

A. Adjustment Panel.

The adjustment panel (left side of chassis) may be freed by loosening three Phillips-head screws and folding the panel back on its hinges. This provides access to the components on the rear of the panel and on the chassis under the panel.

B. Transistor Removal.

(1) Refer to paragraph 9.B.(1) for the removal of the 2N697 transistors Q4, Q5, Q17, Q18, Q24, and Q25.

(2) The remaining transistors on the 344F-1 chassis are mounted in sockets and may be removed by simply pulling them straight out of their sockets.

C. Bearing Mechanism Module Removal.

The bearing mechanism module may be separated from the 344F-1 chassis by removing four screws; two are on top of the chassis and two are on the bottom. If necessary, separate the connectors at the rear of the module.

D. Bearing Mechanism Module Disassembly. Refer to figure 106.

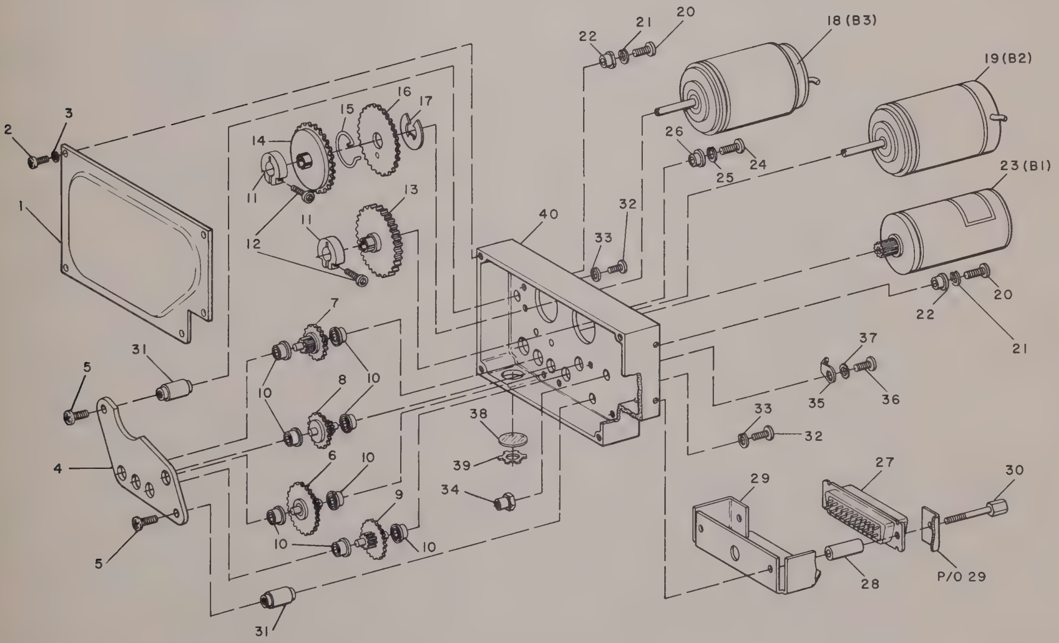
(1) Remove five screws and washers (2 and 3) and cover (1).

(2) Remove two screws (5) and gear plate (4). Bearings (10) may drop out.

(3) Lift spur gears (6, 7, 8, and 9) and remaining bearings (10) from case (40).

(4) Loosen setscrew (12) in each clamp (11), and remove clamps (11), gears (13, 14, and 16), spring (15) and type-E retaining ring (17).

(5) Synchro B3 (18) may be removed by removing screws (20), washers (21), and synchro clamps (22).


22
21
20
18 (B3)
19 (B2)
16
17
15
14
3
2
26
24
25
23 (B1)
11
13
1
32
40
33
12
11
20
22
7
21
37
31
5
10
8
10
35
36
33
32
38
4
6
10
39
27
30
29
9
34
10
10
5
28
P/O 29
31

Bearing Mechanism Module, Exploded View
Figure 106

(6) Resolver B2 (19) may be removed by removing screws (20), washers (21), and synchro clamps (22).

(7) Motor B1 (23) may be removed by removing screws (24), washers (25), and synchro clamps (26).

(8) The connector (27) and its holder (29) may be removed by removing screws (30) and standoffs (28).

51RV-1 VOR/ILS Receiver - Cleaning

1. GENERAL.

This section contains instructions for cleaning the 51RV-1. References to solvent in the procedures refers to Federal Spec. P-S-661a.

WARNING: PERFORM OPERATIONS INVOLVING THE USE OF SOLVENT UNDER A VENTILATING HOOD. AVOID BREATHING SOLVENT VAPORS: WEAR A MASK IF NECESSARY. USE GLOVES, GOGGLES, AND APRON TO PREVENT IRRITATION DUE TO PROLONGED CONTACT WITH SOLVENT. CHANGE CLOTHING THAT BECOMES SATURATED WITH SOLVENT.

References to air jet in the following text refer to a hand-operated air nozzle supplied with clean, dry, compressed air at a pressure of 28 psi maximum.

WARNING: WEAR GOGGLES WHEN USING AIR JET. WARN OTHER PERSONS AWAY FROM HAZARDOUS AREA.

2. DUST COVER CLEANING.

A. Remove bulk of dust and grease with a cloth.

B. Immerse dust cover in a washing bath of solvent, and scrub with a brush until clean. Raise from bath, and allow solvent to drain into bath.

C. Immerse in rinsing bath of clean solvent. Rinse, raise from bath, and allow to drain dry.

3. CONNECTOR CLEANING.

Wipe dust and dirt from body, shell, and cabling using a solvent-moistened cloth. Wipe dry with a clean, dry cloth.

4. CHASSIS AND ELECTRICAL COMPONENTS CLEANING.

A. Remove dust, dirt, and other foreign matter from all surfaces including parts and wiring using a small brush in conjunction with an air jet.

NOTE: When necessary to disturb the dress of wiring and cables, restore to proper position after cleaning.

B. Wipe finished surfaces with a solvent-moistened cloth. Dry immediately with a clean cloth.

CAUTION: EXERCISE CARE IN WIPING SOLVENT FROM COMPONENTS AS COLOR CODING OR SILK SCREENING MAY BE REMOVED.

5. TRANSISTOR SOCKET CLEANING.

A. Wash contacts with solvent applied with a small brush.

B. Remove any foreign matter using a solvent-moistened cloth.

C. Dry with an air jet.

51RV-1 VOR/ILS Receiver - Inspection/Check

1. GENERAL.

This section contains instructions to assist in determining, by inspection, the condition of the cleaned 51RV-1 VOR/ILS Receiver. Defects resulting from wear, physical damage, corrosion, or other causes are found by these inspection procedures.

2. DUST COVER.

Examine dust cover, front plate, handle, and nameplate for deformation, dents, and scratched or badly worn surfaces. Check also for damaged screw heads.

3. CHASSIS.

Check for physical damage or deformation. Check for corrosion and any damage that would require replating or refinishing. Check for broken welds and loose rivets.

4. CONNECTOR.

Examine connector body for breaks, deformed shell, or other abnormal conditions. Check for cracked insulation and for contacts which are broken, deformed, or out of alignment. Examine for damaged plating on contacts and for loose, poorly soldered, or corroded terminal connections.

5. RESISTORS.

Check for cracked, broken, blistered, or charred bodies and for loose, poorly soldered, or corroded terminal connections.

6. CAPACITORS.

Check for cracked, broken, blistered, or charred bodies and for loose, broken, poorly soldered, or corroded terminal connections. Check leads into disc ceramic capacitors for tightness.

7. COILS.

Inspect r-f coils for broken leads, poorly soldered or broken terminal connections, and loose mountings. Check for crushed, cut, or charred windings. Check for physical damage to forms and tuning slug screws.

8. TRANSFORMERS AND FILTERS.

Examine for signs of overheating, physical damage to case, corroded or poorly soldered terminals, and for loose or missing mounting hardware.

9. SOLDERED CONNECTIONS.

Examine for cold-soldered or rosin joints. These appear rough, porous, or dull. Check for strength with a pointed tool. Examine for excess solder, protrusions from joints, pieces adhering to adjacent insulation, and for particules lodged between joints, conductors, or other components.

10. WIRING.

Check all wiring for physical damage and charring. Check lead dress in relation to chassis and to other wiring and components.

11. POTENTIOMETERS.

A. Examine potentiometers for corrosion of shafts, cases, and other visible parts, for loose mounting, and physical damage.

B. Rotate shafts to determine if action is too rough, too loose, or too tight. Note shaft position, and reset as closely as possible after inspection.

C. Check locking collets on all potentiometers.

51RV-1 VOR/ILS Receiver - Repair

1. GENERAL.

The procedures discussed in this section will correct any faults found during performance tests.

2. DUST COVER.

Straighten any deformation, and retouch scratched or worn surfaces. Replace damaged screws.

3. CHASSIS.

Straighten any deformation, and remove all traces of corrosion. Retouch silk screening, and refinish where required. Replace loose rivets.

4. CONNECTOR.

Straighten bent pins. Resolder bad connections, and replace wires with broken insulation. Straighten deformed shell.

5. RESISTORS.

Replace defective resistors, and resolder bad connections.

6. CAPACITORS.

Replace defective capacitors, and resolder bad connections.

7. COILS.

Replace defective coils, and resolder bad connections. Reform coils that have had physical damage but are still usable.

8. TRANSFORMERS AND FILTERS.

Replace or resolder as required.

9. SOLDERED CONNECTIONS.

Resolder any cold-soldered or resin joints. Remove all traces of corrosion.

10. WIRING.

Replace damaged wiring, and move any bare wires that contact the chassis, other bare wires, or the metal cases of other components.

51RV-1 VOR/ILS Receiver - Assembly

1. GENERAL.

This section contains instructions for replacing components and parts in the 51RV-1. These assembly instructions do not contain reference to routine procedures for soldering leads. If wires or leads were unsoldered, replace using a solder of composition SN60 and by referring to the color coding and lead dress noted during disassembly. Liquid stake the threads of all non-locked screws with blue varnish.

2. ASSEMBLY OF 51V-4B GLIDE SLOPE RECEIVER.

A. Transistor Replacement.

All transistors, except Q10, Q11, and Q12, are mounted in transistor sockets. To replace these transistors, align the tab on the transistor body with the small, square hole near the transistor socket, and insert the transistor pins into the holes in the socket.

NOTE: Early models of the 51V-4 use transistors for first oscillator Q1, tripler Q14, injection amplifier Q15, and 30-megacycle i-f amplifier Q2 stages with a different location for the marking tab. When replacing Q1, Q2, Q14, or Q15 with types T-2028 or T2030 printed on the case, position the transistor to align the red dot on the transistor with the square notch on the chassis. Transistors T-2028 and T-2030 are electrically identical to the 2N2398 and 2N2362.

(1) Series Regulator Q12 Replacement.

Refer to figure 103A. Mount the square insulator and the fiber insulator on the transistor, and insert the transistor in the chassis mounting holes, positioning the transistor case on the left side of the chassis. Place the mica and metal washers and the solder terminal on the transistor stud, and secure in place by tightening the nut on the stud. Solder all leads and wires to the transistor elements as coded in disassembly.

(2) Audio Output Transistor, Q10 or Q11, Replacement.

Refer to figure 103B. Place the transistor in the heat sink, and secure in place by tightening the cap nut on the heat sink. Mount the mica washer and the insulator on the heat sink stud, and insert the heat sink through the mounting hole from the right side of the chassis. Place the mica and metal washers over the heat sink stud, and secure the assembly to the chassis by tightening the nut. Solder the transistor element leads on the right side of the chassis as coded in disassembly.

B. R-F Subassembly Cover Replacement.

Place the cover over the r-f subassembly, align holes, and secure with the six screws and split lock washers.

C. Rear Connector-Capacitor Replacement.

(1) Insert the capacitor into the hole in the rear connector cover. The locations of the capacitors are shown in figure 104. Heat the metal around the capacitor, and apply a low-melting point, 3-percent silver soft solder (Kester 44 or equivalent) around the capacitor. Do not overheat the assembly or place the soldering iron on an adjacent capacitor. Solder the lead wires to the capacitor terminals.

(2) Insert the connector into the cover, and slip the assembly into position at the rear of the 51V-4 chassis. Secure assembly to the chassis with the four screws.

D. 90/150-CPS Filter FL3 Replacement.

Position the filter so that the solder terminals are toward the rear of the chassis. Place the filter in position, and allow the mounted lugs to penetrate the holes provided in the chassis. Secure using two shakeproof nuts and two standoff posts.

E. Oscillator Subassembly Replacement.

Position the oscillator subassembly with crystals toward the chassis, and secure using three screws. Mount subassembly cover on the subassembly, and secure with the screw.

3. ASSEMBLY OF 51X-4 VOR/LOC RECEIVER.

A. Transistor Replacement.

(1) Transistor Q9. Refer to figure 105.

Place the fiber insulators in the two smaller mounting holes and the large insulator over the holes on the right side of the regulator plate. Secure the transistor to the chassis as shown with the screws, mica washers, and nuts. Solder the element leads as coded in disassembly.

(2) Place transistor Q17 in the heat sink spring fingers and solder leads.

(3) The remaining transistors on the 51X-4 chassis are mounted in sockets. To replace these transistors, align the tab on the transistor body with the small, square hole near the transistor socket, and insert the transistor pins into the holes in the socket.

B. Subassembly Cover Removal.

(1) The covers for the vhf oscillator, 10-channel h-f oscillator, and 2-channel oscillator subassemblies are secured to the 51X-4 chassis by one screw.

(2) Secure the r-f assembly to the 51X-4 chassis by five screws.

4. ASSEMBLY OF 344A-2 MANUAL VOR/LOC INSTRUMENTATION UNIT.

A. Transistor Replacement.

(1) Transistor Q8.

Refer to paragraph 3.A.(1) above to replace the 2N2201 transistor.

(2) Transistors Q3, Q10, Q11, Q17, Q18, Q24, and Q25. Refer to figure 103B. Place the transistor in the heat sink, and secure in place by tightening the cap nut on the heat sink. Mount the mica washer and the insulator on the heat sink stud, and insert the heat sink through the mounting hole from the right side of the chassis. Place the mica and metal washers over the heat sink stud, and secure the assembly to the chassis by tightening the nut. Solder the transistor element leads on the right side of the chassis as coded in disassembly.

(3) The remaining transistors on the 344A-2 chassis are mounted in sockets. To replace these transistors, align the tab on the transistor body with the small, square hole near the transistor socket, and insert the transistor pins into the holes in the socket.

(4) Adjustment Panel.

Secure the adjustment panel to the 344A-2 chassis by tightening the three Phillips-head screws.

5. ASSEMBLY OF 344F-1 AUTOMATIC VOR INSTRUMENTATION UNIT.

A. Transistor Replacement.

Refer to steps (2) and (3) in paragraph 4.A. above.

B. Adjustment Panel.

Secure the adjustment panel to the 344F-1 chassis by tightening the three Phillips-head screws.

C. Bearing Mechanism Module Assembly. Refer to figure 106.

(1) Mount lug (35) and standoff (34) to case (40) with screw and washer (36 and 37).

(2) Mount standoffs (31) to case (40) with screws and washers (32 and 33).

(3) Place connector (27) inside its holder (27), inserting standoffs (28) as shown, and secure to case (40) with screws (30).

(4) Mount motor B1 (23) to case (40), and secure with synchro clamps (26), screws and washers (24 and 25).

(5) Mount resolver B2 (19) to case with synchro clamps (22), screws and washers (21 and 21).

(6) Mount synchro B3 (18) to case with synchro clamps (22), screws and washers (20 and 21).

(7) Place type-E retaining ring (17), gear (16), spring (15), gear (14), and clamp (11) on shaft of resolver B2 (19), and secure by tightening screw (12).

(8) Load gears (14 and 16) 12 teeth (60 degrees) and place gear (13) and clamp (11) on shaft of resolver B2 (19), and secure by tightening screw (12).

(9) Insert bearings (10) in case as shown, and place spur gears (9, 8, 7, 6), in this order, in the bearings. Place a bearing on the other end of gears.

(10) Place gear plate (4) on these bearings and standoffs (31), and secure with screws (5).

D. Bearing Mechanism Module Adjustment.

(1) Fabricate the test jig shown in figure 1003.

(2) Connect P1 of the module to J1 of the test jig. Apply 26-volt, 400-cps power to the test jig.

(3) Actuate motor-generator test switch S1. The motor, as viewed from the shaft end, should turn clockwise, and the voltage at test jig GENERATOR OUTPUT jacks J5 and J6 should be greater than 2.5 volts and out of phase with the 26-volt, 400-cps input power.

NOTE: If phasing is incorrect, reverse generator output leads (at pins 12 and 24).

(4) Lock the gear train by placing locking gear on standoff (34) (figure 106), and secure with a 4-40x3/16-inch screw and no. 4 flat washer.

(5) Loosen screw on gear hub clamp of resolver B2 (figure 106), connect TP16 of test jig to the oscilloscope Y-input, J7 of test jig to oscilloscope X-input, and J3 (ground) of test jig to oscilloscope ground, and set the 10-volt, 400-cps switch to ON.

(6) Turn the shaft of resolver B2 to obtain approximately an in-phase indication on the oscillocope.

(7) Connect the oscilloscope Y-input to TP17 on the test jig.

(8) Turn the resolver shaft 60 ±20 degrees clockwise. If the voltage is out of phase, reverse the resolver leads connected to pin 17 of module connector P1 and ground.

(9) Turn resolver shaft to obtain a null on the oscilloscope.

(10) Connect the oscilloscope Y-input to TP16 on the test jig. If the voltage is not in phase, interchange resolver leads connected to pin 16 (module connector P1) and ground.

(11) Tighten the screw on the gear hub clamp of resolver B2.

(12) Connect TP20 of the test jig to the oscilloscope Y-input and J7 to the X-input. Connect a vtvm between TP19 and TP20, and connect TP9 to TP8 and then to 10 volts, 400 cps (J7).

(13) Loosen screw on clamp, and turn synchro differential B3 shaft to obtain an out-of-phase voltage on the oscilloscope and a null on the vtvm.

(14) Connect the vtvm between TP20 and J5 (ground) on the test jig, and turn the shaft of B3 counterclockwise approximately 10 degrees. If the voltage decreases, interchange leads of B3 connected to pins 19 and 20 of module connector P1.

(15) Connect the vtvm between TP19 and TP20 on the test jig. Repeat step (13).

(16) Connect TP20 to TP19 and then to J7 on the test jig, connect the vtvm between TP9 and J5, and turn synchro B3 shaft counterclockwise approximately 10 degrees. If the voltage decreases, interchange B3 leads at pins 8 and 9 of module connector P1.

(17) Connect the oscilloscope Y-input to TP8 and the X-input to J7, and a vtvm between TP8 and TP9 on the test jig. Turn the shaft of B3 to obtain a null on the vtvm and an out-of-phase voltage on the oscilloscope.

(18) Lock the shaft by tightening screw in gear clamp, and remove the locking gear.

(19) Secure cover (1) to case (40) with five screws (2) and washers (3).

E. Bearing Mechanism Module Replacement.

(1) Mate the rear connector of the bearing mechanism module with J8 on the 344F-1 chassis, and position the module in place in the 344F-1 chassis.

(2) Secure the module to the chassis by inserting and tightening two screws on the top and two screws on the bottom of the 344F-1 chassis.

51RV-1 VOR/ILS Receiver - Testing

1. GENERAL.

This section describes testing and adjustment procedures for the 51RV-1, including complete alignment procedures. The specified limits listed are for optimum performance of the 51RV-1. The following definitions will apply as used in this manual.

A. Standard Test Signals.

(1) VOR Test Signal.

The r-f carrier, at an input level of 1000 microvolts, is amplitude modulated simultaneously by a 30-percent, 9960-cps subcarrier and a 30-percent, 30-cps variable phase signal. The 9960-cps is frequency modulated at a deviation ratio of 16 by a 30-cps reference phase signal. The phase of the variable signal can be varied with respect to the reference signals.

(2) VOR Test Audio Signal.

The standard VOR test signal with the r-f carrier amplitude modulated by a 30-percent 1000-cps signal.

(3) Audio Test Signal.

An r-f carrier amplitude modulated 30 percent by 1000 cps.

(4) Localizer Test Signals.

(a) Standard Test Signal.

An r-f carrier, at an input level of 1000 microvolts, is amplitude modulated simultaneously with 90-cps ±0.3 percent and 150-cps ±0.3 percent signals so the separate modulation percentages are equal and their sum equals 40 ±2 percent.

(b) Centering Signal.

The standard test signal where the difference in depth of modulation of the 90 and 150 cps is less than 0.002 (0.1 db).

(c) Deviation Signal.

The standard test signal where the difference in depth of modulation is 0.093 ±0.002 (4 ±0.1 db).

(d) Localizer Audio Signal.

A standard localizer test signal to which is added an audio signal amplitude modulating the carrier 30 percent.

(5) Glide Slope Test Signals.

(a) Standard Signal.

An r-f carrier amplitude modulated simultaneously with 90 cps ±0.3 percent and 150 cps ±0.3 percent so the separate modulation percentages are equal and their sum is 90 ±2 percent.

(b) Centering Signal.

The standard test signal where the difference in depth of modulation between the 90 and 150 cps is less than 0.2 percent (0-db ratio).

(c) Deviation Signal.

The standard test signal where the difference in depth of modulation between the 90 and 150 cps signals is a ratio of 2.0 db, and a deflection of 78 microamperes is produced with an input level of 700 microvolts.

2. TEST EQUIPMENT REQUIRED.

The test equipment, or its equivalent, necessary to test and align the 51RV-1 is listed in figure 1001.

3. POWER SOURCE REQUIRED.

A +27.5-volt d-c, ±2 percent, -20 percent power source, rated at approximately 1.5 amperes maximum, a 115-volt, ±2 percent, 400-cps ±5-percent power source, and a 115-volt, ±10 percent, 60-cps power source are required to test, align, and trouble-shoot the 51RV-1.

4. 51V-4B GLIDE SLOPE RECEIVER ALIGNMENT AND TESTS.

A. Preliminary Steps.

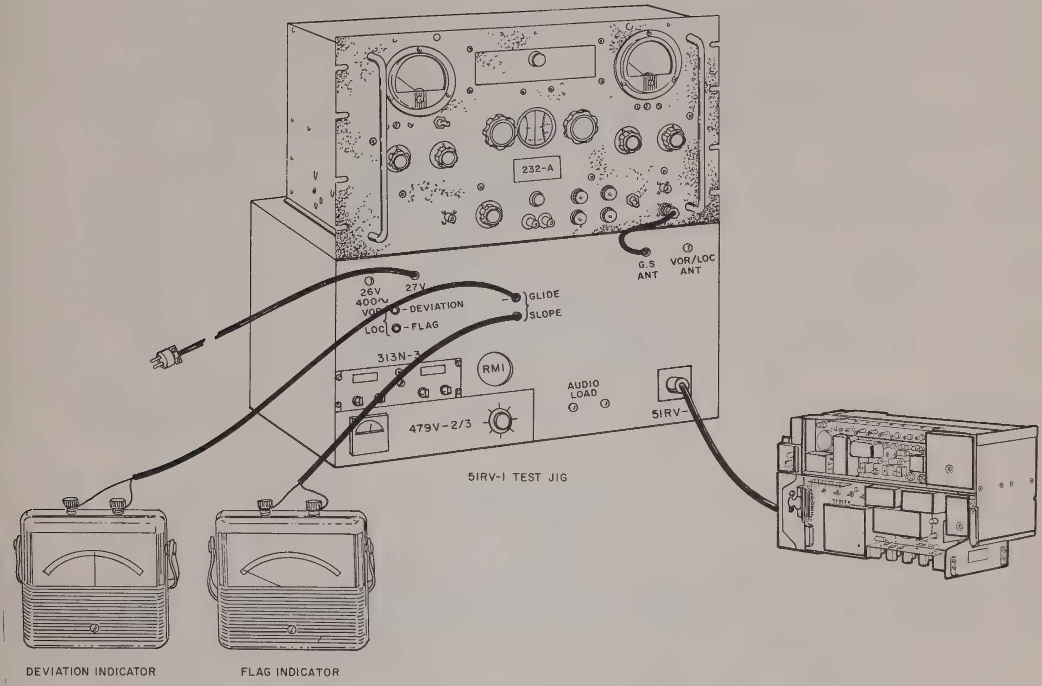
(1) Connect the 51RV-1 to the test jig, mating the rear connector of the 51RV-1 with J1 on the test jig. Refer to figure 701. Ensure that the 51V-4B is mounted in and properly connected to the respective 51RV-1 connector.

(2) Connect the deviation indicator to the GLIDE SLOPE DEVIATION jack and the flag indicator to the GLIDE SLOPE FLAG jack.

(3) Ensure that the Boonton 232-A is properly calibrated and adjusted to provide a standard centering signal.

(4) Connect a 27.5-volt d-c source to the test jig 27V jack, and set the 313N-3 power switch to PWR.

(5) Loosen locking nut, and adjust the course-softening control R54 (figure 702) completely counterclockwise.


232-A
G.S ANT
VOR/LOC ANT
26V 400~
27V
VOR
LOC
- DEVIATION
- FLAG
GLIDE
SLOPE
313N-3
RMI
AUDIO LOAD
479V-2/3
51RV-
51RV-1 TEST JIG
DEVIATION INDICATOR
FLAG INDICATOR

51V-4B Test Setup
Figure 701

B. First Oscillator Alignment.

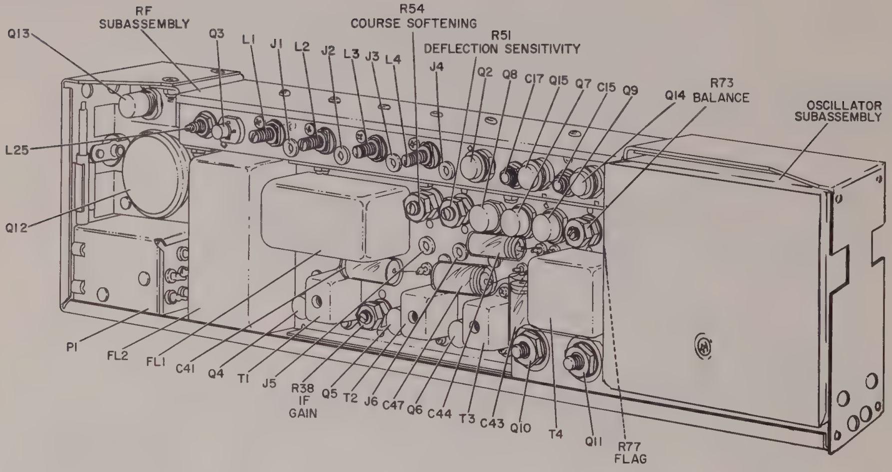
(1) Remove the cover on the oscillator subassembly.

(2) Set the 313N-3 NAV frequency to 109.3 mc (localizer frequency paired with the glide slope frequency of 332.0 mc).

(3) Connect the d-c vtvm leads to the oscillator tuning probe jacks J1 and J2 (see figure 1005), and place the tuning probe across crystal Y7 terminals (figure 703).

(4) Set the vtvm to obtain a reading on the lowest scale, and adjust L7 to obtain a minimum reading (approximately 0.1 volt).

(5) Remove the oscillator tuning probe, replace the oscillator subassembly cover, and secure with the screw.


RF SUBASSEMBLY
R54 COURSE SOFTENING
R51 DEFLECTION SENSITIVITY
Q13
Q3
L1
J1
L2
J2
L3
J3
L4
J4
Q2
Q8
C17
Q15
Q7
C15
Q9
Q14
R73 BALANCE
OSCILLATOR SUBASSEMBLY
L25
Q12
P1
FL2
FL1
C41
Q4
T1
J5
R38 IF GAIN
Q5
T2
J6
C47
Q6
C44
T3
C43
Q10
T4
Q11
R77 FLAG

51V-4B Oblique View
Figure 702

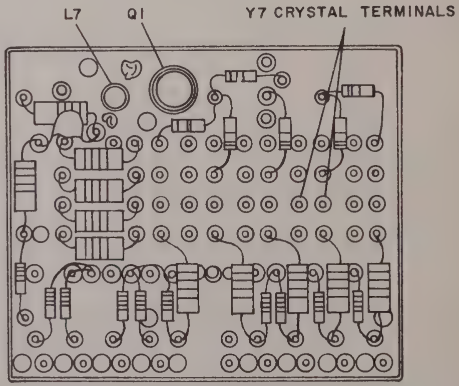
C. Alignment of R-F, First Oscillator Injection, Second Mixer-Oscillator, and I-F Circuits.

(1) Connect the 232-A RF OUTPUT to the test jig G.S. ANT connector, and tune the 232-A to 332.0 mc.

(2) Ensure that the 313N-3 NAV frequency is set to 109.3 and connect the d-c vtvm probe to J5 (figure 702) and the common lead to J6 of the 51V-4B if the lead is floating, and to ground if the common lead is connected to bench common. Adjust the 232-A r-f output level to obtain 0.5 volts agc above zero signal level. (Approximately 1.5 to 2.0 volts for J5 to J6 or 7.5 to 8.0 volts for J5 to ground connections.)

(3) Adjust L25, T1, T2, and T3 (figure 702) to obtain maximum voltage at J6.

NOTE: If two peaks are obtained when adjusting T1, T2, and T3, set the slug at the position where it is nearest the transformer terminals.


L7
Q1
Y7 CRYSTAL TERMINALS

Oscillator Subassembly, Top View, Cover Removed
Figure 703

(4) Apply standard test signal modulation from the 232-A. Adjust C15 and C17 (figure 702) to obtain maximum flag current as indicated on the flag indicator. Reduce the 232-A r-f output level to keep the flag current at approximately 100 microamperes when adjusting C15 and C17.

NOTE: The agc voltage may dip slightly when C15 and C17 are adjusted for maximum flag current. This is normal indication and indicates saturation of the mixer diode.

(5) Clip the leads of two 100-ohm resistors to one-half inch, and connect one of the resistors between J2 (figure 702) and chassis ground, and adjust L1 to obtain pulse 0.5 volt agc above zero signal level.

(6) Remove the resistor connected in preceding step and connect it between J1 and ground. Connect the second resistor between J3 and ground.

(7) Adjust L2 to obtain maximum agc voltage. Remove the two resistors, and connect between J2 and ground and between J4 and ground.

(8) Adjust L3 to obtain maximum agc voltage. Remove the resistors, and connect one between J3 and ground.

(9) Adjust L4 to obtain maximum agc voltage. Remove the resistor.

(10) Adjust the signal output level of the 232-A to 4 microvolts, and adjust i-f gain control R38 (figure 702), from maximum counterclockwise position, until the flag current just reaches a maximum. At this point further clockwise rotation will not increase the flag current. The 51V-4B now is set to have maximum sensitivity with minimum noise.

D. Audio Instrumentation Adjustments.

(1) Ensure that the 232-A is calibrated properly, and then set the MOD switch to 90-150 , the TONE RATIO control to 0, the FREQUENCY control to 332.0 mc, and the OUTPUT LEVEL control to 700 microvolts.

(2) Set the 313N-3 NAV frequency to 109.3 mc.

(3) Loosen the locking nut on balance control R73 (figure 702), and adjust R73 to obtain zero microamperes on the deviation indicator.

(4) Set the 232-A TONE RATIO control to 2.0 (90 cps greater than 150 cps). Loosen the locking nut on deflection sensitivity control R51 (figure 702), and adjust R51 to obtain 78 microamperes on the deviation indicator meter.

(5) Loosen the locking nut on flag control R77 (figure 702), and adjust to obtain 375 microamperes on the flag indicator meter.

(6) Repeat steps (3), (4), and (5) for the r-f input levels and audio ratios given in figure 704. If the recommended limits given in figure 704 are not obtained, set course-softening control R54 (figure 702) slightly clockwise, and repeat steps (3), (4), and (5).

(7) Tighten locking nuts on controls R51, R73, R77, and R54; make sure that the control is not turned.

(8) Recheck to ensure that limits given in figure 704 are still obtained.

R-F INPUT LEVEL (uv)	AUDIO RATIO	DEVIATION CURRENT (ua)	FLAG CURRENT (ua)
700	0 db	0 ±0.5	375 ±5
700	2 db (90~ greater than 150~)	78 ±0.5	375 ±5
14,000	0 db	0 ±2.0	375 ±10
14,000	2 db (90~ greater than 150~)	78 ±2.0	375 ±10

Recommended Audio Adjustment Limits
Figure 704

5. 51V-4B PERFORMANCE TESTS.

Initial adjustments and alignment procedures, given in paragraph 4, must be performed before proceeding to the following tests. If a specified limit is not met, refer to the trouble-shooting chart, figure 801, to localize the trouble.

A. Power Supply.

(1) Connect the 51RV-1 to the test jig.

(2) Connect the deviation indicator to the GLIDE SLOPE DEVIATION jacks and the flag indicator to the GLIDE SLOPE FLAG jacks on the test jig.

(3) Apply +27.5 volts d-c to the test jig 27.5 V jack, and set the 313N-3 power switch to PWR.

(4) Set the 313N-3 NAV frequency to 109.3 mc. The voltage at the collector of Q12 (case, figure 702) should be 16 ±1.6 volts d-c.

B. I-F Selectivity.

(1) Apply a 332.0-mc, unmodulated signal from the 608D, through the 505-A 6-db pad, to the test jig G.S. ANT connector.

(2) Connect the d-c vtvm to agc jacks J5 and J6. (Connect the common lead to J6.)

(3) Adjust the 608D frequency to obtain maximum agc voltage.

(4) Adjust the 608D output signal level to obtain approximately 0.5 volt d-c above noise level at J6. (Noise level is the agc voltage at J6 with zero signal input.) Record the 608D output signal level and the agc voltage.

(5) Loop several turns of one end of a wire connected to the 51J-4 ANTENNA input, and place the turns between Q6 and T3 (figure 702). Tune the 51J-4 to 3.1 megacycles.

(6) Determine the 6-db bandwidth and error as follows:

(a) Double the 608D output signal level recorded in step (4), and detune the 608D above the resonant frequency to obtain the agc voltage recorded in step (4).

(b) Tune the 51J-4 above 3.1 mc to obtain a zero beat in headphones connected to the 51J-4 PHONES jack. Record the 51J-4 frequency (51V-4B i-f).

(c) Detune the 608D below the resonant frequency to obtain the agc voltage recorded in step (4).

(d) Tune the 51J-4 below 3.1 mc to obtain a zero beat in headphones connected to the 51J-4 PHONES jack. Record the 51J-4 frequency (51V-4B i-f).

(e) Subtract the i-f recorded in step (d) from that recorded in step (b). The difference should be more than 140 kc. This is the 6-db bandwidth.

(f) Subtract the center of the frequencies recorded in steps (b) and (d) from the nominal i-f, 3.1 megacycles. This difference (6-db error) should be less than 10 kc.

(7) Determine the 60-db bandwidth and error as follows:

(a) Increase the 608D signal level recorded in step (4) 1000 times, and detune the 608D above the resonant frequency to obtain the agc voltage recorded in step (4).

(b) Tune the 51J-3 above 3.1 mc to obtain a zero beat in headphones connected to the 51J-4 PHONES jack. Record the 51J-4 frequency (51V-4B i-f).

(c) Detune the 608D below the resonant frequency to obtain the agc voltage recorded in step (4).

(d) Tune the 51J-4 below 3.1 mc to obtain a zero beat in headphones connected to the 51J-4 PHONES jack. Record the 51J-4 frequency (51V-4B i-f).

(e) Subtract the i-f recorded in step (d) from that recorded in step (b). The difference should be less than 450 kc. This is the 60-db bandwidth.

(f) Subtract the center of the frequencies recorded in steps (b) and (d) from the nominal i-f, 3.1 mc. This difference (60-db error) should be less than 45 kc.

C. Linearity and Balance.

(1) Connect the 232-A RF OUTPUT through the 505-A 6-db pad to the test jig G.S. ANT connector, and set the MOD switch to 90-150~ , the FREQUENCY control to 332.0 mc, and the OUTPUT LEVEL control to 700 microvolts.

(2) Set the 232-A TONE RATIO control to each 0.5 position. The deviation indicator reading should be 19.5 ±3 microamperes for each position.

(3) Set the TONE RATIO control to the 2.0 position which applies a stronger 150-cps signal. The deviation indicator reading should be 78 ±3 microamperes.

(4) Set the TONE RATIO control to each 4.0 position. The deviation indicator reading should be 156 ±15 microamperes for each position. (Use the X2 position on S1 of the test jig.) The deviation indicator reading should be 128 ±13 microamperes if the 232-A TONE CONTROL is set to a 3.3 position.

D. AGC Characteristics.

(1) Set the 232-A FREQUENCY control to 332.0 mc and the TONE RATIO control to 0. Set the test jig FREQUENCY SELECTOR to 332.0-A and the A/B switch to A.

(2) Vary the 232-A output signal level from 40 to 100,000 microvolts. The deviation indicator reading should be 0 ±4 microamperes, and the flag indicator reading should be more than 270 microamperes.

(3) Set the 232-A TONE RATIO control to the 2.0-position which applies a stronger 90-cps signal.

(4) Vary the 232-A output signal level from 40 to 100,000 microvolts. The deviation indicator reading should be between 67 and 82 microampers.

E. Flag Characteristics.

(1) Connect the 232-A RF OUTPUT to the test jig G.S. ANT. connector. Set the 232-A FREQUENCY control to 332.0 mc, the TONE RATIO control to 0, and the OUTPUT LEVEL control to obtain a signal output level of 700 microvolts. The flag indicator reading should be 375 ±5 microamperes.

(2) Set the 232-A TONE RATIO control to CAL 90∼. The flag indicator reading should be less than 200 microamperes.

(3) Set the 232-A TONE RATIO control to CAL 150∼. The flag indicator reading should be less than 200 microamperes.

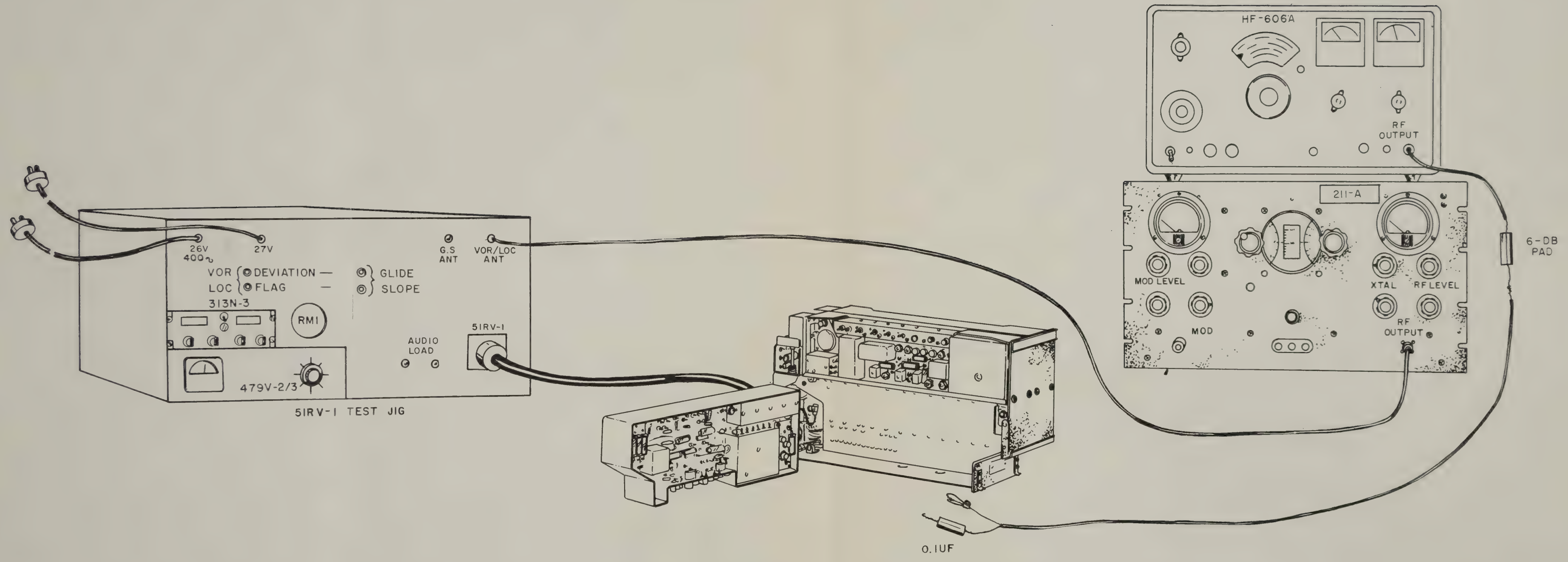
(4) Remove the r-f output connected to the test jig ANTENNA connector. The flag indicator reading should be 10 microamperes or less.

F. R-F Sensitivity.

(1) Connect the 232-A RF OUTPUT to the test jig G.S. ANT connector through the 505-A 6-decibel pad, and set the 232-A TONE RATIO control to one 2.0 position.

(2) Adjust the 232-A OUTPUT LEVEL control to obtain 47 microamperes on the deviation indicator. The 232-A output level should be less than 20 microvolts.

(3) Perform steps (1) and (2) above for each of the 20 channels, setting the 313N-3 NAV frequency to a localizer frequency paired with the output frequency of the 232-A.


HF-606A
RF OUTPUT
211-A
MOD LEVEL
MOD
XTAL
RF LEVEL
RF OUTPUT
6-DB PAD
26V 400~
27V
G.S ANT
VOR/LOC ANT
VOR
DEVIATION
LOC
FLAG
GLIDE
SLOPE
313N-3
RMI
51RV-1
AUDIO LOAD
479V-2/3
51RV-1 TEST JIG
0.1UF

51X-4 Test Setup
Figure 705

NOTE: If the 232-A output level required is greater than 20 microvolts for any particular channel or channels, trouble may be in the switching circuits. Refer to paragraph 3 in the trouble-shooting section of this manual to localize this trouble.

6. VOR/LOC UNITS PERFORMANCE TESTS.

A. General.

The over-all operation of the 51RV-1 is checked in the following procedures. If the specified limits are not met, (after required adjustments) refer to alignment and/or trouble-shooting procedures to localize the trouble.

B. Preliminary Procedures.

(1) Fabricate the 51RV-1 test jig according to figure 1002.

(2) Remove the 51RV-1 dust cover, and connect P1 of the test jig to the 51RV-1 rear connector.

(3) Apply 26-volt, 400-cps and 27.5-volt d-c power to the test jig power connectors.

C. Channel Operation.

(1) Refer to figure 705, and connect the 211-A RF OUTPUT to the test jig VOR/LOC ANT jack through the 514-B cable and 505-B attenuator. Set the 211-A MOD switch to 1000, and set the FREQUENCY control to 108.00 megacycles.

(2) Connect the 600-ohm load across the test jig AUDIO LOAD terminals and P4 of the test jig to J2 of the 313N-3. Set the 313N-3 NAV power switch to PWR.

(3) Connect an oscilloscope across the 600-ohm load, set the 313N-3 NAV frequency and the 211-A frequency to each of the following frequencies, and check if the 1000-cps waveform can be seen on the oscilloscope: 109.15 mc, 110.20 mc, 111.35 mc, 112.40 mc, 113.55 mc, 114.60 mc, 115.75 mc, 116.80 mc, and 117.95 mc.

D. Sensitivity Check.

(1) Set the 313N-3 NAV frequency to 108.00 mc, connect a d-c vtvm to TP3 on the 51X-4 (figure 806), and adjust the 211-A frequency control near 108.00 megacycles to obtain a peak indication on the d-c vtvm.

(2) Set the output level of the 211-A to 100 microvolts, the MOD switch to 1000∼ , the MOD LEVEL control to obtain 30-percent modulation, and the RF LEVEL control to obtain a red line indication on the RF MONITOR meter.

(3) Connect the 400D vtvm across the 600-ohm load, and adjust audio gain control R111 (figure 806) to obtain approximately 7.8 volts a-c.

This control is located in the emitter of the first audio amplifier Q16 and provides a means to vary the audio level coupled to second audio amplifier Q17.

(4) Set the 211-A output level to 3 microvolts, and record the db level. Then set the MOD switch to EXT. The 400-D output level should decrease 6 db or more.

(5) Repeat steps (1) through (4) above for the following frequencies: 108.5 mc; 109.5 mc; 110.5 mc; 111.5 mc; 112.5 mc; 113.5 mc; 114.5 mc; 115.5 mc; 116.5 mc; 117.5 mc.

(6) Proceed to paragraph F if results obtained in steps (4) and (5) are satisfactory.

E. 51X-4 VOR/LOC Receiver.

(1) 51X-4 Alignment and Tests.

(a) Connect the 51RV-1 to the test jig, and apply 27.5 volts to the test jig power connector. The voltage at TP2 on the 51X-4 (figure 806) should be 16 ±0.5 volts.

(b) Connect the 91C r-f voltmeter to the base of Q11 (TP18, figure 807). The oscillator injection voltage should be approximately 0.2 volt for both 50-kc positions of the 313N-3 NAV frequency control.

(c) Connect the frequency counter to TP18 (2-channel h-f oscillator output). The frequency should be within ±0.0035 percent of 5.10 mc (108.00 313N-3 frequency) and 5.15 mc (108.05 313N-3 frequency).

(d) Set the 313N-3 NAV frequency to 108.00 mc, and connect the frequency counter to the ten channel h-f oscillator output (TP20 figure 807). Adjust L27 (figure 807) to obtain 16.95 mc on the counter.

(e) Connect the 91C r-f voltmeter to TP20 (figure 807). The voltage should be approximately 0.1 volts for all tenth megacycle positions of the 313N-3 NAV frequency control.

(f) Set the 313N-3 NAV frequency to the frequencies in figure 706. The frequency should be within ±.0035 percent of the frequency listed.

(g) Set the 313N-3 NAV frequency to 108.00 mc. Connect the frequency counter and the 91C r-f voltmeter to the vhf oscillator output (TP22 figure 806).

(h) Adjust C32 (figure 806) to obtain 86.450 mc on the counter. The voltage, at the base of Q2, should be approximately 0.08 volt for all megacycle frequencies. The frequency should be within ±0.0035 percent of the frequency listed for each 313N-3 NAV frequency listed in figure 707.

(i) Connect the d-c voltmeter to TP3 (figure 806) and the HP-606 output through a 6-db pad, and 0.1-microfarad capacitor to TP18 (figure 807).

(j) Set the signal generator frequency to 500 kc, and adjust the HP-606 output level to obtain approximately 2.5 volts d-c at TP3.

313N-3 NAV FREQUENCY	FREQUENCY COUNTER
108.00	16.95
108.10	17.05
108.20	17.15
108.30	17.25
108.40	17.35
108.50	17.45
108.60	17.55
108.70	17.65
108.80	17.75
108.90	17.85

Table of 10-Channel H-F Oscillator Frequencies
Figure 706

TUNING VOLTAGE	313N-3 NAV FREQUENCY	FREQUENCY COUNTER
6.443	108	86.45
6.982	109	87.45
7.567	110	88.45
8.201	111	89.45
8.889	112	90.45
9.637	113	91.45
10.453	114	92.45
11.340	115	93.45
12.307	116	94.45
13.364	117	95.45

Table of Matrix Tuning Voltages and VHF Oscillator Frequencies
Figure 707

(k) Adjust the cores of i-f transformers T5, T4, T3, and T2 to obtain a maximum voltage at TP3.

NOTE: Two peaks may be observed when tuning the i-f transformers. Tune the slugs to the peak found with the slugs closest to the transformer terminals. During tuning, reduce the input signal level, if necessary, to keep the voltage at TP3 near 2.5 volts d-c.

(l) Repeat step j until the voltage at TP3 can no longer be increased.

(m) Connect the differential voltmeter to TP1 (figure 808), and set the 313N-3 NAV frequency to 117.0 megacycles.

(n) Remove one screw and loosen the other, and lift up R70. Adjust R70 (figure 808) to obtain 13.364 volts on the differential voltmeter.

(o) Set the 313N-3 NAV frequency to 108.00 megacycles. The differential voltmeter reading should be 6.443 ±0.05 volts d-c and should increase as the selected frequency is increased. The tuning voltage for each frequency should be within the ±0.05 volt of the value listed in figure 707.

(p) Connect the d-c voltmeter to TP3 (figure 808), set the 313N-3 NAV frequency to 116.60 megacycles, and connect the 211-A to the test jig VOR/LOC ANT connector through a 6-db pad and a 0.1-microfarad capacitor. Set the 211-A frequency to 116.60 megacycles, and modulate the carrier with 1000 cps at 30 percent.

(q) Swamp coils L5 and L2 (figure 809) with the tuning slugs, and adjust the 211-A output level so the voltage at TP3 is approximately 2.5 volts d-c.

(r) Adjust capacitors C4 and C11 (figure 808) to obtain a maximum indication at TP-3. During the tuning, reduce the input signal, if necessary, to keep the voltage at TP3 near 2.5 volts d-c.

(s) Swamp coils L1 and T7 with the tuning slug, and adjust C9 and C19 to obtain a maximum indication at TP3.

(t) Set the 211-A and 313N-3 NAV frequencies to 109.60 megacycles, and bend coils L2 and L5 to obtain a maximum indication at TP3.

(u) Swamp coils L2 and L5 with the tuning slugs, and bend coils L1 and L7 to obtain a maximum indication at TP3.

(v) Repeat steps (p) through (u) above until no increase in voltage at TP3 can be obtained.

(w) Connect the 91C r-f voltmeter to TP21 (figure 809) (across R140), and remove transistor Q4.

(x) Set the 313N-3 NAV frequency and the 211-A frequency to 108.50 megacycles (vary 211-A frequency to obtain a peak indication on r-f voltmeter), and adjust the 211-A OUTPUT LEVEL to obtain a convenient reading on the r-f voltmeter. Record db reading and frequency.

(y) Vary the frequency of the 211-A above and below that recorded in step (w) to obtain a drop of 2 db on the r-f voltmeter for each setting. The bandwidth of the 2-db points should be greater than 1.25 megacycles.

(z) Repeat steps (x) and (y), but determine the bandwidth at the 20-db points. This bandwidth should be 3.75 megacycles or less.

(2) Sensitivity Check.

Perform steps in paragraph 6.D.

(3) Noise Level Check.

(a) Set the 211-A frequency and the 313N-3 NAV frequency to 113.45 mc modulated 30 percent at 1000 cps and at a 100-microvolt level.

(b) Note db reference across the 600-ohm load, and remove the 1000 modulation. The signal-plus-noise to noise ratio should be 30 db or more.

(4) Selectivity Check.

(a) Set the 211-A frequency and 313N-3 NAV frequency to 113.45 mc. Set the 211-A unmodulated R-F LEVEL to obtain a reference voltage below AGC threshold (approximately 1.5 to 2.5 volts) on the vtvm connected to TP3 (figure 809). Record this reference voltage.

(b) Connect a pick-up loop to the 51J-4 antenna jack, and place other end near TP12 (figure 809). Adjust the 211A frequency to obtain 500 kc in the third i-f stage (T5).

(c) Increase the output level of the 211-A by 6 db (double), and tune the 211-A above and below 113.45 mc to obtain the reference voltage recorded in step (a) at TP3. Tune the 51J-4 to measure the i-f above and below 500 kc. The total bandwidth should be greater than 50 kc.

(d) Increase the 211-A R-F LEVEL 1000 times that set in step (a), and tune the 211-A above and below 113.45 mc to obtain the reference voltage recorded in step (a) at TP3. Tune the 51J-4 to measure the i-f above and below 500 kc. The total bandwidth should be 65 kc or less.

(5) Spurious Rejection Check.

(a) Connect the headphones and oscilloscope across the 600-ohm load, and set the 211-A frequency and the 313N-3 NAV frequency to 113.45 mc. Adjust the 211-A frequency slightly to obtain maximum voltage at TP3.

(b) Adjust the 211-A R-F LEVEL to obtain a reference voltage below AGC threshold on the vtvm at TP3, note db reference, and then set the R-F LEVEL to 10K microvolts.

(c) Sweep the 211-A frequency 2 megacycles above and below 110.45 mc, and record the db level and spurious frequency found. Any spurious frequency should be at least 70 db below the desired signal level.

(6) Voltage Regulation Check.

(a) Connect the differential voltmeter at TP2 (figure 808), and record the reading when 27.5 volts d-c is applied.

VOR/LOC DEVIATION jacks, and adjust VOR ZERO control R100, if necessary, to obtain a center indication on the deviation indicator.

VOR ZERO control R100 provides a means to shift the phase of the variable 30-cps signal by varying the resistance in the RC phase shift network in the input circuitry of the variable 30-cps amplifiers.

(5) Set the 479V-2/3 BEARING DEGREES control to 270 degrees. Adjust VOR Ø BAL control R91, if necessary, to obtain half the indication from zero.

VOR Ø BAL control R91 provides a means to vary the resistance in one bridge network, making it possible to balance current flow in the VOR phase detector.

(6) Repeat steps (4) and (5) until there is no deviation from zero microampere on the deviation indicator.

(7) Set the 479V-2/3 BEARING DEGREES control to 150 degrees and the 479S-3 PHASE ANGLE SELECTOR to 330 degrees. Adjust VOR TRACK control R61, if necessary, to obtain a center indication on the deviation indicator.

VOR TRACK control R61 is used to vary the resistance of one resolver output so it matches the reactance of the other resolver output. This makes it possible for the resolver output to be shifted in phase so it matches (or tracks) the position of the resolver rotor (positioned by OBS knob).

(8) Repeat steps (4), (5), and (7) until no deviation from zero is obtained on the deviation indicator.

(9) Set the 479S-3 PHASE ANGLE SELECTOR to 270 degrees and the 479V-2/3 BEARING DEGREES control to 90 degrees. Connect the flag indicator to the test jig VOR/LOC FLAG jacks, and adjust VOR FLAG control R58, if necessary, to obtain 300 ±5 microamperes on the flag indicator.

VOR FLAG control R58 provides a means to adjust the current in the VOR phase detector which is coupled through the flag alarm meter movement.

(10) The 479V-3 TO-FROM meter reading should be in the TO portion. Set the 479V-3 BEARING DEGREES control to 270 degrees. The TO-FROM meter reading should be 60 microamperes or less when the BEARING DEGREES control is set to 0 or 180 degrees.

(11) Set the 479S-3 SPECIFIC SIGNAL SELECTOR to 9960 FM and the FUNCTION SELECTOR to CAL. The flag indicator reading should be 220 microamperes or less.

(12) Set the SPECIFIC SIGNAL SELECTOR to 30~ VAR Ø. The flag indicator reading should be 220 microamperes or less.

(13) Set the 479S-3 FUNCTION SELECTOR to ODR, the 479V-2/3 BEARING DEGREES control to 90 degrees, and the 479S-3 PHASE ANGLE SELECTOR to 280 degrees. Adjust the VOR SENSITIVITY control R59, if necessary, to obtain 150 microamperes on the deviation indicator.

VOR SENSITIVITY control R59 provides a means to vary the deviation needle movement current from the VOR phase detector.

(14) Set the 479S-3 PHASE ANGLE SELECTOR to 260 degrees. The deviation indicator reading should be 150 ±3 microamperes.

51RV-1 VOR/ILS RECEIVER

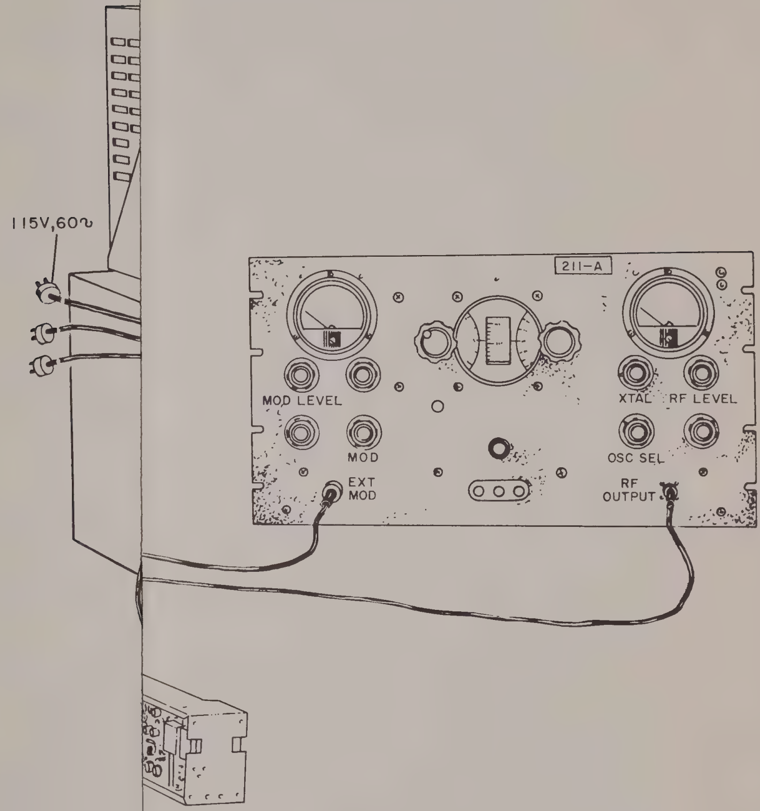
OVERHAUL MANUAL (523-0736003)

TEMPORARY REVISION NO. 34-35-0-3

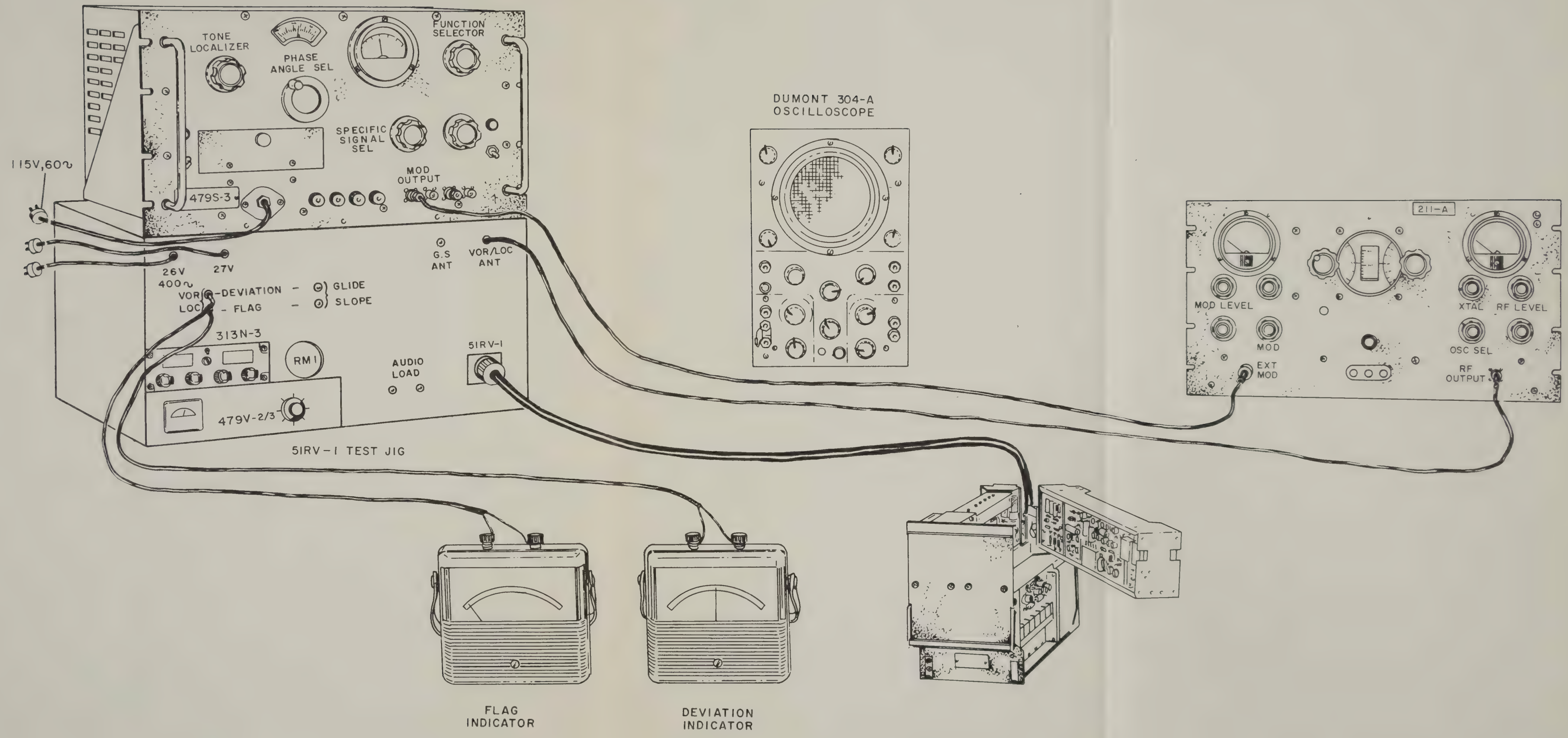
Insert this page adjacent to 34-35-0, page 718.

The following note should be placed after step (8):

Note: Some manufacturer's indicators will not give a flag warning until the flag current drops below approximately 180 microamperes. When the 51RV-1 is used with this type of indicator, the flag current setting in step (9) below, and the flag current readings in steps (11) and (12) below should be lower than normal. The flag current should be in proportion to the level that will give a flag warning on the indicator.


115V,60∿
211-A
MOD LEVEL
MOD
EXT MOD
XTAL
RF LEVEL
OSC SEL
RF OUTPUT

344F-2 Test Setup
Figure 708


TONE LOCALIZER
PHASE ANGLE SEL
FUNCTION SELECTOR
SPECIFIC SIGNAL SEL
MOD OUTPUT
479S-3
115V,60~
26V 400~
27V
G.S ANT
VOR/LOC ANT
VOR - DEVIATION
LOC - FLAG
GLIDE SLOPE
313N-3
RM1
AUDIO LOAD
51RV-1
479V-2/3
51RV-1 TEST JIG
DUMONT 304-A OSCILLOSCOPE
211-A
MOD LEVEL
MOD
EXT MOD
XTAL
RF LEVEL
OSC SEL
RF OUTPUT
FLAG INDICATOR
DEVIATION INDICATOR

344F-2 Test Setup
Figure 708

(15) Depress the 313N-3 VOR TEST switch, and set the 479V-2/3 BEARING DEGREES control to zero degree. The deviation indicator reading should be 0 ±15 microamperes, the flag indicator reading should be 300 ±25 microamperes, and the 479V-2/3 TO-FROM meter reading should be FROM. The RMI pointer should read 180 ±4 degrees.

(16) Under conditions listed in (15) above, TEST ZERO control R132 may be adjusted, if necessary, to obtain zero microampere on the deviation indicator.

TEST ZERO control R132 provides a means to vary the resistance in the test 30-cps RC circuitry and change the phase of the test 30-cps signal during alignment so the proper indications are obtained with input signals set up for VOR test conditions.

(17) Adjust the 211-A MOD LEVEL control to reduce the percentage of modulation until the flag indicator reading is 250 microamperes. Adjust flag sensitivity control R17 (figure 102) on the frame until the VOR/LOC power flag light just turns on. Release the VOR TEST switch.

(18) Ensure that the 211-A and 313N-3 NAV frequencies are set to 114.90 mc and a standard VOR input signal is applied to the 51RV-1. Set the 479V-2/3 BEARING DEGREES control to each 30-degree increment, and adjust the 479S-3 PHASE ANGLE SELECTOR to obtain zero microampere on the deviation indicator. The 479S-3 dial reading should be within 0.3 degree of the 479V-2/3 BEARING DEGREES control setting.

(19) Perform the VOR tracking check in step (18) for input voltages of 25 volts d-c and 30 volts d-c.

(20) Set the 479V-2/3 BEARING DEGREES control to 270 degrees. Adjust the 479S-3 PHASE ANGLE SELECTOR to obtain zero microampere on the deviation indicator for input signal levels of 5, 10, 50, 100, 1000, 10,000, and 20,000 microvolts. The 479S-3 dial reading should be 270 ±0.3 degrees for each input signal level.

H. Automatic VOR Instrumentation Check. Refer to figure 709.

(1) Ensure that the 479S-3 FUNCTION SELECTOR is set to ODR, and set the 313N-3 NAV and 211-A frequencies to 114.9 megacycles.

(2) Connect the HP-400D vtvm to REF LEVEL jack J3 (TP 24, figure 817) on the 344F-1, and adjust REF LEVEL control R64, if necessary, to obtain 4.5 volts a-c at J3. REF LEVEL control R64 provides a means to vary the gain of the reference 30-cps stages.

(3) Connect the a-c vtvm to VAR LEVEL jack J4, and adjust VAR LEVEL control R101, if necessary, to obtain 4.5 volts a-c at J4.

VAR LEVEL control R101 provides a means to vary the gain of the variable 30-cps stages.

(4) Set the 479V-2/3 BEARING DEGREES control to 90 degrees and the 479S-3 PHASE ANGLE SELECTOR to 270 degrees. Adjust ZERO control R100 to obtain an RMI reading of 90 degrees.

ZERO control R100 provides a means to shift the phase of the variable 30-cps signal by varying the resistance in the RC phase shift network in the input circuitry of the variable 30-cps amplifiers.

(5) Set the 479V-2/3 BEARING DEGREES control to 150 degrees and the 479S-3 PHASE ANGLE SELECTOR to 330 degrees. Adjust TRACK control R61, if necessary, to obtain an RMI reading of 180 degrees.

TRACK control R61 is used to vary the resistance of one resolver output so it matches the reactance of the other resolver output. This makes it possible for the resolver output to be shifted in phase so it matches (or tracks) the position of the resolver rotor (positioned by the bearing mechanism motor).

(6) Repeat steps (4) and (5) until no further adjustment is necessary.

(7) Set the test jig compass simulator to zero degree. Then, while watching the RMI card, rotate the compass simulator until the RMI card starts to move. Repeat this procedure 10 times. The compass simulator reading should be between two and three degrees.

(8) Rotate the compass simulator rapidly, and note the RMI card makes only one overshoot before settling on the desired heading.

(9) Adjust the 479S-3 PHASE ANGLE SELECTOR until the RMI pointer indication is zero degree. While watching the RMI pointer, rotate the 479S-3 PHASE ANGLE SELECTOR until the pointer starts to move. The 479S-3 PHASE ANGLE SELECTOR dial reading at this instant should be 0.5 degree or less.

(10) Rotate the 479S-3 PHASE ANGLE SELECTOR rapidly, and then stop. The RMI pointer should have only one overshoot before settling on the correct reading. Adjust RATE control R2, if necessary, to obtain just one overshoot.

RATE control R2 provides a means to vary the amount of rate feedback coupled to the input of the bearing servo amplifier from the rate generator.

(11) Depress the 313N-3 VOR TEST switch. The RMI pointer should point to 180 degrees. Release the VOR TEST switch.

(12) Ensure that the 211-A and 313N-3 NAV frequencies are set to 114.90 mc and a standard VOR input signal is applied to the 51RV-1. Set the 479S-3 PHASE ANGLE SELECTOR to each 30-degree increment, and observe the test jig RMI indication. The RMI reading should be within 1.0 degree of the 479S-3 PHASE ANGLE SELECTOR setting.

I. Localizer Instrumentation Check.

(1) Set the 211-A frequency control and the 313N-3 NAV frequency to 110.10 megacycles, the output level of the 211-A to 1000 microvolts, and the 479S-3 FUNCTION SELECTOR 20 percent modulation. Set TONE LOCALIZER to CAL 150, and adjust the 211-A for 20 percent modulation. Recheck at CAL 90. Set the TONE LOCALIZER control to 0. The RMI pointer should remain stationary at the 3 o'clock position (±10 degrees).

(2) Adjust the 344A-2 LOCALIZER CENTERING control R52, if necessary, to obtain a center indication on the deviation indicator.

LOCALIZER CENTERING control R52 provides a means to equalize the 90- and 150-cps signal current flow through the deviation needle movement.

(3) Adjust the LOCALIZER FLAG control R42, if necessary, to obtain a flag indicator reading of 375 ±5 microamperes.

51RV-1 VOR/ILS RECEIVER

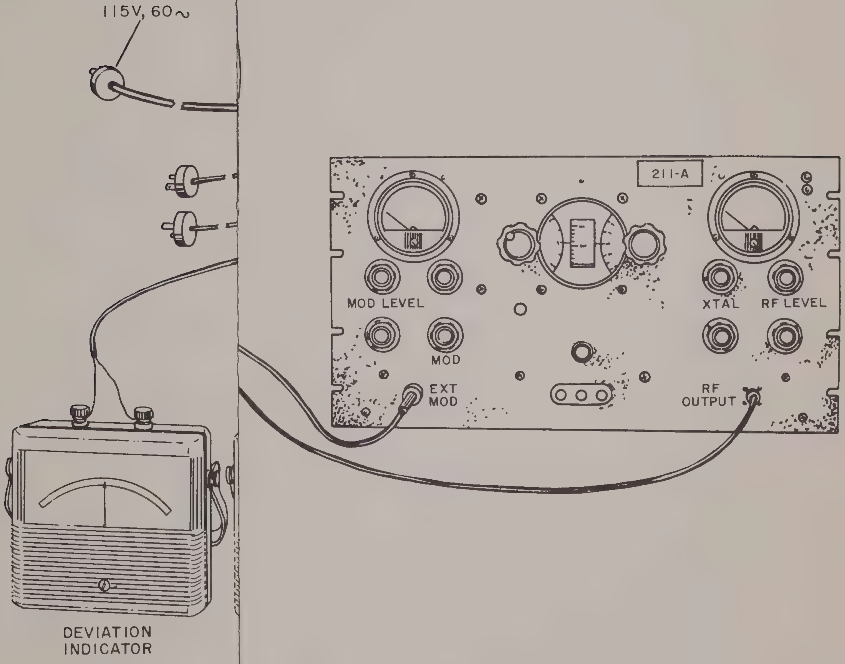
OVERHAUL MANUAL (523-0736003)

TEMPORARY REVISION NO. 34-35-0-3

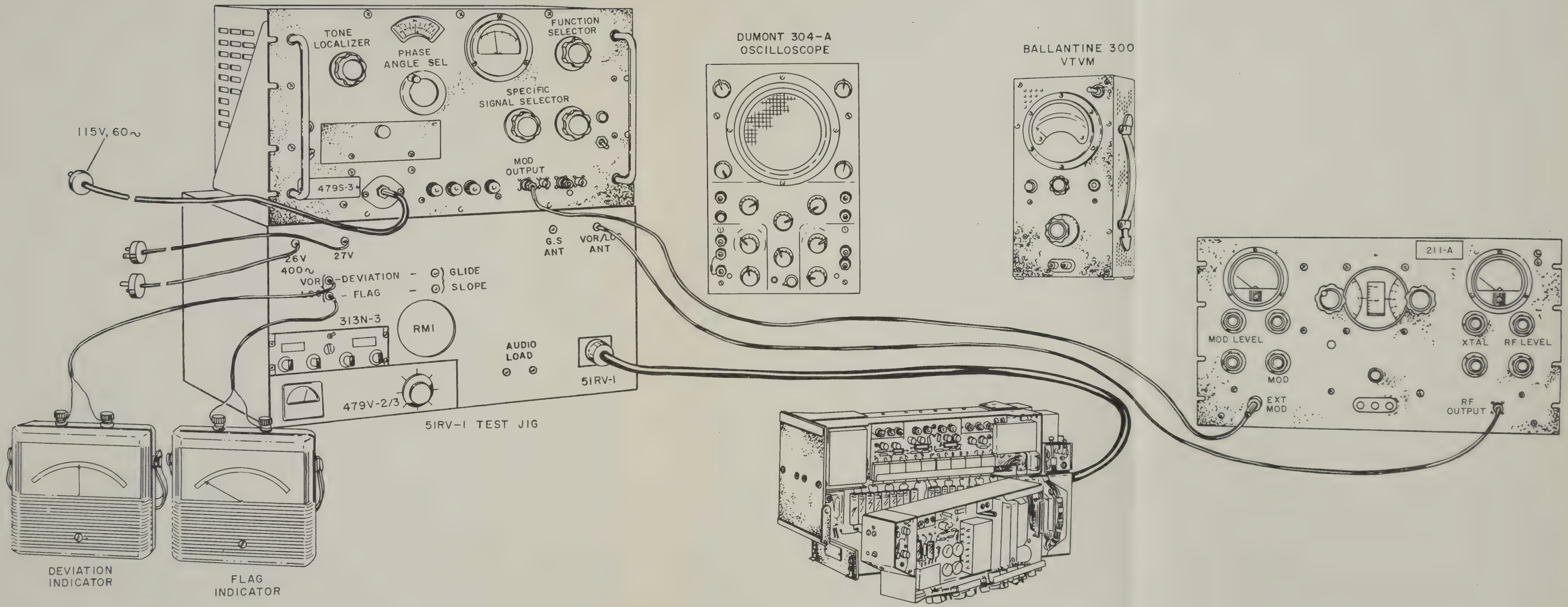
Insert this page adjacent to 34-35-0, page 722.

The following note should be placed after step I. (2):

Note: Some manufacturer's indicators will not give a flag warning until the flag current drops below approximately 180 microamperes. When the 51RV-1 is used with this type of indicator, the flag current setting in step (3) below, and the flag current readings in steps (4) and (5) below should be lower than normal. The flag current should be in proportion to the level that will give a flag warning on the indicator.


115V, 60~
211-A
MOD LEVEL
XTAL
RF LEVEL
MOD
EXT MOD
RF OUTPUT
DEVIATION INDICATOR

344F-1 Test Setup
Figure 709


115V, 60~
TONE LOCALIZER
PHASE ANGLE SEL
FUNCTION SELECTOR
SPECIFIC SIGNAL SELECTOR
479S-3
MOD OUTPUT
26V
400~
27V
VOR
-DEVIATION
GLIDE
- FLAG
SLOPE
G.S ANT
VOR/LO ANT
313N-3
RMI
AUDIO LOAD
51RV-1
479V-2/3
51RV-1 TEST JIG
DUMONT 304-A OSCILLOSCOPE
BALLANTINE 300 VTVM
211-A
MOD LEVEL
MOD
EXT MOD
XTAL
RF LEVEL
RF OUTPUT
DEVIATION INDICATOR
FLAG INDICATOR

344F-1 Test Setup
Figure 709

LOCALIZER FLAG control R42 provides a means to vary the current flow through the flag alarm meter movement by adjusting the gain of amplifier Q9.

(4) Set the 479S-3 TONE LOCALIZER control to CAL 90. The flag indicator reading should be 175 microamperes or less.

(5) Set the 479S-3 TONE LOCALIZER control to CAL 150. The flag indicator reading should be 175 microamperes or less.

(6) Set the 479S-3 TONE LOCALIZER control to either 4 DB position. Adjust LOCALIZER SENSITIVITY control R53, if necessary, to obtain 90 microamperes on the deviation indicator.

LOCALIZER SENSITIVITY control R53 provides a means to vary the amount of current flowing through the deviation needle movement when there is an unbalance in the amplitude comparator.

(7) Measure the a-c voltage at the 344A-2 VOR VAR LEVEL and VOR REF LEVEL jacks J2 and J1, and at the 344F-1 VAR LEVEL jack J4. Each reading should be less than one volt.

J. 51RV-1 Frame Checks.

(1) Apply approximately 0.25 volt d-c to VOR/LOC terminals 3 (+) and 4 (-) of J2 to obtain 250 microamperes on the test flag indicator.

(2) Adjust R17 (figure 102) until the test jig VOR/LOC power flag light is on.

(3) Apply approximately 0.25 volt d-c to glide slope terminals 15 (+) and 16 (-) of J5 to obtain 250 microamperes on the test jig flag indicator.

(4) Adjust R26 (figure 102) until the test jig glide slope power flag light is on.

(5) Remove the 51RV-1 from the test jig and apply 27.5 volts d-c between pins 34 (+) and 18 (-) of the bottom plug of rear connector P3. The localizer/glide slope relay K1 should energize after a delay of approximately one second.

(6) Remove the voltage source connected in step (5), and measure the resistance between the connector pins listed in figure 710. The resistances should be within 3 percent of those given in figure 710.

TERMINALS	RESISTANCE
TP-9 to TP-2	1000 ohms
TP-9 to TP-3	500 ohms
TP-9 to TP-14	250 ohms
TP-22 to TP-25	1000 ohms
TP-22 to TP-26	500 ohms
BP-40 to BP-30	1000 ohms
BP-40 to BP-48	500 ohms
BP-40 to BP-49	250 ohms
BP-42 to BP-31	1000 ohms
BP-42 to BP-32	500 ohms
BP-44 to BP-33	200 ohms

Table of 51RV-1 Frame Resistance Checks
Figure 710

K. ILS SELF TEST (if Installed).

(1) Fabricate the test jig according to the schematic diagram, figure 1002.

NOTE: All localizer and glide slope instrumentation adjustments should be completed before testing or adjusting the ILS self-test circuitry.

(2) Connect P1 of the test jig to the 51RV-1 connector.

(3) Connect the 313N-3 (J2) to P4 on the test jig.

(4) Apply 26-volt, 400-cps and 27.5 volt d-c power to the test jig power connectors.

(5) Set the 313N-3 NAV frequency to 110.10 mc and the power switch to PWR.

(6) Depress either the UP/LEFT or the DOWN/RIGHT switch on the 51RV-1 front panel and connect the probe of the 524D to J1. The 524D should indicate 450 ±0.5 cps. If necessary adjust R7 to obtain the proper frequency.

(7) Connect the deviation indicator to the VOR/LOC DEVIATION jacks and the flag indicator to the VOR/LOC FLAG jacks. Depress the UP/LEFT switch. The deviation indicator reading should be 75 ±5 microamperes and the flag indicator reading should be 375 ±25 microamperes. Adjust R1 to vary localizer deviation current and R2 to vary localizer flag current. (These adjustments interact and may require several trials to reach the proper values.)

(8) Depress the DOWN/RIGHT switch. The deviation indicator reading should be 75 ±5 microamperes and the flag indicator reading should be 375 ±50 microamperes.

Adjust R3 to vary localizer deviation current.

(9) Connect the deviation indicator to GLIDE SLOPE DEVIATION jacks and the flag indicator to GLIDE SLOPE FLAG jacks. Depress the UP/LEFT switch. The deviation indicator reading should be 75 ±5 microamperes and the flag indicator reading should be 375 ±25 microamperes.

Adjust R4 to vary glide slope deviation current and R5 to vary glide slope flag current. (These adjustments interact and may require several trials to reach the proper values.)

(10) Depress the DOWN/RIGHT switch. The deviation indicator reading should be 75 ±5 microamperes and the flag indicator reading should be 375 ±50 microamperes.

Adjust R6 to vary glide slope deviation current.

51RV-1 VOR/ILS Receiver - Trouble Shooting

1. GENERAL.

This section contains information for locating a trouble in the 51RV-1 if faulty operation appears when the performance test procedures are performed. The units of the 51RV-1 can be tested and checked while connected to the 51RV-1 frame. All tests listed in this section are given for this condition, using the 51RV-1 test jig.

2. TROUBLE ANALYSIS.

Isolate the trouble to a particular unit and/or section of the 51RV-1 by using the trouble-shooting charts and stage gain block diagrams (803, 804, 805, 806, and 807). Localize the trouble as follows:

A. Make d-c voltage checks in the B+ circuits of the units.

B. Refer to the trouble-shooting chart and stage gain block diagrams, and make detailed checks to isolate the faulty stage.

C. Make d-c voltage checks in the faulty stage, and check with those given on the schematics. Remove power, and make continuity checks if abnormal.

D. If transistor element voltages are normal, substitute the transistor to determine if the transistor is faulty.

E. Circuit trace stages in the instrumentation units using an oscilloscope, and compare waveforms obtained with those shown on the block diagrams (figures 805 and 806).

3. 51V-4B TROUBLE-SHOOTING PROCEDURES.

A. General.

This section contains information for locating a trouble, or troubles, in the 51V-4B if a specified limit is not met when performing the test procedures given in paragraph 5 of the Testing section. Aids for trouble isolation are the stage gain block diagram and d-c voltages on the 51V-4B schematic given in figure 802 and the trouble-shooting chart, figure 801.

B. Trouble Analysis.

Isolate the trouble to a particular section in the 51V-4B using the trouble-shooting chart (figure 801) and/or stage gain block diagram in figure 802. Localize the trouble as follows:

(1) Make d-c voltage measurements, and check with those given on the 51V-4B schematic on figure 802. If d-c voltages obtained are abnormal, remove power, and make continuity checks in the particular stage to locate the trouble.

(2) If transistor element voltages are normal, substitute the transistor to determine if the transistor is at fault.

(3) Refer to the stage gain block diagram in figure 802, and make detailed checks to isolate a stage at fault.

C. Trouble-Shooting Chart.

The following chart (figure 801) outlines procedures which will aid in trouble-shooting the 51V-4B and gives the normal indications which should be obtained for each procedure. Abnormal indications which may be obtained, along with possible troubles and/or procedures to locate a trouble, are also given for each procedure. Perform the alignment procedures and performance tests, paragraphs 4 and 5 of the Testing section, after a trouble has been corrected.

STEP	INSTRUCTIONS	NORMAL INDICATION	INDICATION OBTAINED	PROCEDURE
PRELIMINARY	Connect 51RV-1 to test jig, 232-A RF OUTPUT to test jig GS ANT jack, deviation indicator and flag indicator to GLIDE SLOPE DEVIATION and FLAG jacks, and +27.5 volts d-c to 27 VDC jacks. Set the 313N-3 NAV frequency to 109.30 mc. Set the 232-A MOD switch to 90-150~, the TONE RATIO control to 0, FREQUENCY control to 332.0 megacycles, and the OUTPUT LEVEL to 700 microvolts.			
1	Set the test jig POWER switch to ON.	Power source current should be 120 to 160 milliamperes.	a. Current greater than 160 milliamperes.	a. Immediately set the test jig POWER switch to OFF. Make continuity checks in the d-c regulator circuit and in the (Cont)

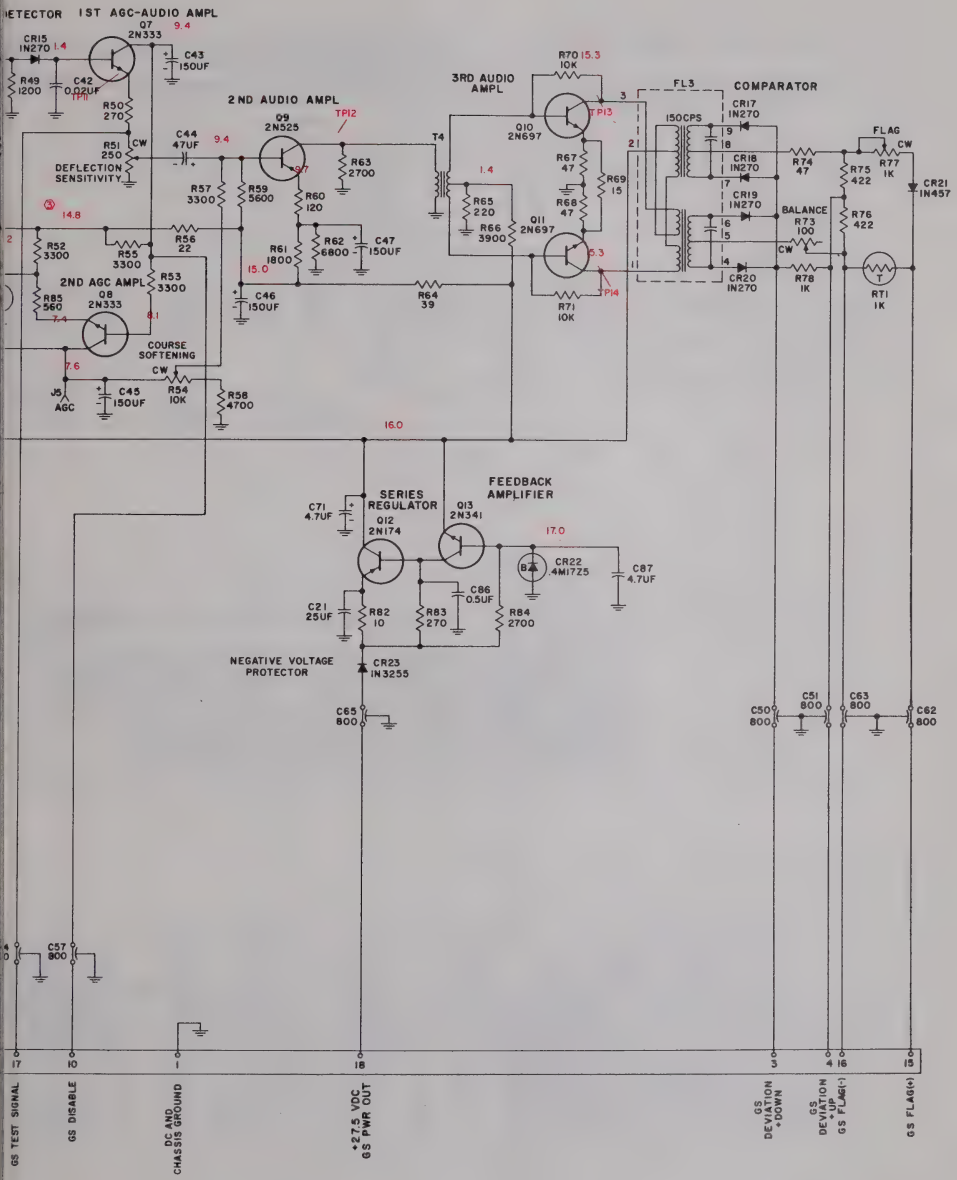
51V-4B Trouble-Shooting Chart (Sheet 1 of 3)
Figure 801

STEP	INSTRUCTIONS	NORMAL INDICATION	INDICATION OBTAINED	PROCEDURE
1 (Cont)				(Cont) receiver B plus circuitry. POSSIBLE TROUBLE: Shorted Q10, Q11, or B+ line.
			b. Current less than 120 milliamperes.	b. Check if voltage on Q12 collector (case) is 16 ±1.6 volts d-c. If voltage is low, check d-c regulator circuitry. POSSIBLE TROUBLE: Faulty CR22 or open resistor.
			c. Normal current.	c. Proceed to step 2.
2	Continue with instructions set up in step 1.	Test jig flag indicator reading is 375 ±5 microamperes, and deviation indicator meter reading is 0 ±0.5 microampere.	a. Low reading on flag indicator and deviation indicator shows a right or left deflection.	a. Proceed to step 3.
			b. Zero current on flag indicator and deviation indicator reading is normal.	b. Make continuity checks in the flag indicator circuit. POSSIBLE TROUBLE: Open R77 or CR21.
			c. Flag indicator reading is low or zero, and deviation indicator reading remains at zero.	c. Proceed to step 4.

51V-4B Trouble-Shooting Chart (Sheet 2 of 3)
Figure 801

STEP	INSTRUCTIONS	NORMAL INDICATION	INDICATION OBTAINED	PROCEDURE
3	Vary the OUTPUT LEVEL of the 232-A from 100 to 30,000 microvolts.	Flag and deviation indicator readings should remain nearly constant.	a. Flag and deviation indicator readings remain constant.	a. Make continuity checks in the output circuit. Check d-c resistance of diodes CR17-CR20 in both directions.
			b. Flag and deviation indicator readings vary as the signal input is increased.	b. Check d-c voltages in the agc amplifiers. POSSIBLE TROUBLE: Faulty C43, C45, or C41.
4	Connect a d-c vtvm between J5 and J6 of the 51V-4 (common lead to J6), and vary the 232-A OUTPUT LEVEL control to obtain an output level of 0 to 30 microvolts.	Agc voltage, indicated on the d-c vtvm, should have a minimum change of 1.0 volt d-c.	a. Change in agc voltage is a minimum of 1.0 volt d-c.	a. Make d-c voltage checks and stage gain measurements in audio amplifiers Q9, Q10, and Q11 to isolate the trouble in these stages. Refer to figure 802. Substitute transistors only if element voltages are normal.
			b. Agc voltage is constant.	b. Refer to the stage gain chart, figure 802, to localize trouble to i-f, r-f, first oscillator, or band-pass filter sections of 51V-4B.

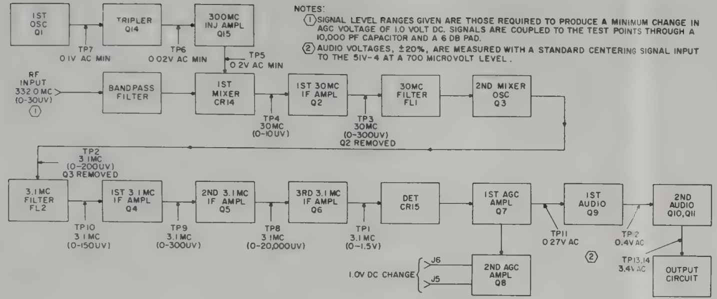
51V-4B Trouble-Shooting Chart (Sheet 3 of 3)
Figure 801


ETECTOR
1ST AGC-AUDIO AMPL
Q7
2N333
9.4
CR15
1N270
1.4
C43
150UF
R49
1200
C42
0.02UF
TP11
R50
270
R51
250
CW
DEFLECTION
SENSITIVITY
C44
47UF
9.4
2ND AUDIO AMPL
Q9
2N525
TP12
9.7
R63
2700
R57
3300
R59
5600
R60
120
③
14.8
2
R52
3300
R55
3300
R56
22
R61
1800
R62
6800
C47
150UF
15.0
C46
150UF
R53
3300
2ND AGC AMPL
Q8
2N333
R85
560
7.4
8.1
7.6
COURSE
SOFTENING
CW
R54
10K
R58
4700
J5
AGC
C45
150UF
3RD AUDIO
AMPL
T4
R70
10K
15.3
Q10
2N697
TP13
1.4
R65
220
R66
3900
R67
47
R68
47
R69
15
Q11
2N697
5.3
TP14
R71
10K
R64
39
3
21
11
FL3
150CPS
COMPARATOR
CR17
1N270
19
18
CR18
1N270
17
CR19
1N270
16
15
14
CR20
1N270
R74
47
BALANCE
R73
100
CW
R78
1K
FLAG
CW
R75
422
R77
1K
R76
422
CR21
1N457
RT1
1K
T
16.0
SERIES
REGULATOR
Q12
2N174
FEEDBACK
AMPLIFIER
Q13
2N341
C71
4.7UF
17.0
CR22
4M17Z5
B
C87
4.7UF
C86
0.5UF
C21
25UF
R82
10
R83
270
R84
2700
NEGATIVE VOLTAGE
PROTECTOR
CR23
1N3255
C65
800
C50
800
C51
800
C63
800
C62
800
C57
800
17
10
1
18
3
4
16
15
GS TEST SIGNAL
GS DISABLE
DC AND
CHASSIS GROUND
+27.5 VDC
GS PWR OUT
GS
DEVIATION
+DOWN
GS
DEVIATION
+UP
GS FLAG(-)
GS FLAG(+)

51V-4B Trouble Shooting and Alignment Information
Figure 802

STEP	INSTRUCTIONS	NORMAL INDICATION	INDICATION OBTAINED	PROCEDURE
3	Vary the OUTPUT LEVEL of the 232-A from 100 to 30,000 microvolts.	Flag and deviation indicator readings should remain nearly constant.	a. Flag and deviation indicator readings remain constant.	a. Make continuity checks in the output circuit. Check d-c resistance of diodes CR17-CR20 in both directions.
			b. Flag and deviation indicator readings vary as the signal input is increased.	b. Check d-c voltages in the agc amplifiers. POSSIBLE TROUBLE: Faulty C43, C45, or C41.
4	Connect a d-c vtvm between J5 and J6 of the 51V-4 (common lead to J6), and vary the 232-A OUTPUT LEVEL control to obtain an output level of 0 to 30 microvolts.	Agc voltage, indicated on the d-c vtvm, should have a minimum change of 1.0 volt d-c.	a. Change in agc voltage is a minimum of 1.0 volt d-c.	a. Make d-c voltage checks and stage gain measurements in audio amplifiers Q9, Q10, and Q11 to isolate the trouble in these stages. Refer to figure 802. Substitute transistors only if element voltages are normal.
			b. Agc voltage is constant.	b. Refer to the stage gain chart, figure 802, to localize trouble to i-f, r-f, first oscillator, or band-pass filter sections of 51V-4B.

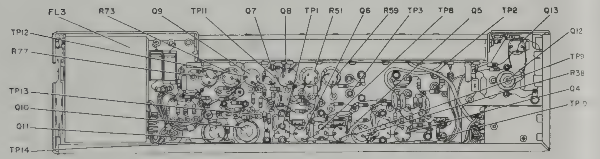
51V-4B Trouble-Shooting Chart (Sheet 3 of 3)
Figure 801

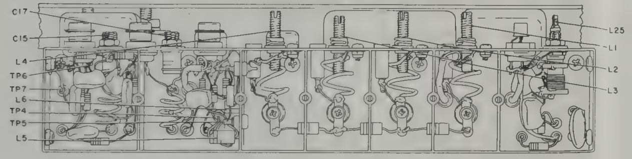

1ST OSC Q1
TRIPLER Q14
300MC INJ AMPL Q15
TP7 0.1V AC MIN
TP6 0.02V AC MIN
TP5 0.2V AC MIN
RF INPUT 332.0 MC (0-30UV) ①
BANDPASS FILTER
1ST MIXER CR14
1ST 30MC IF AMPL Q2
30MC FILTER FL1
2ND MIXER OSC Q3
TP4 30MC (0-10UV)
TP3 30MC (0-300UV) Q2 REMOVED
TP2 3.1MC (0-200UV) Q3 REMOVED
3.1MC FILTER FL2
1ST 3.1MC IF AMPL Q4
2ND 3.1MC IF AMPL Q5
3RD 3.1MC IF AMPL Q6
DET CR15
1ST AGC AMPL Q7
1ST AUDIO Q9
2ND AUDIO Q10, Q11
TP10 3.1MC (0-150UV)
TP9 3.1MC (0-300UV)
TP8 3.1MC (0-20,000UV)
TP1 3.1MC (0-1.5V)
TP11 0.27V AC
TP12 0.4V AC
②
TP13,14 3.4V AC
OUTPUT CIRCUIT
J6
J5
1.0V DC CHANGE
2ND AGC AMPL Q8

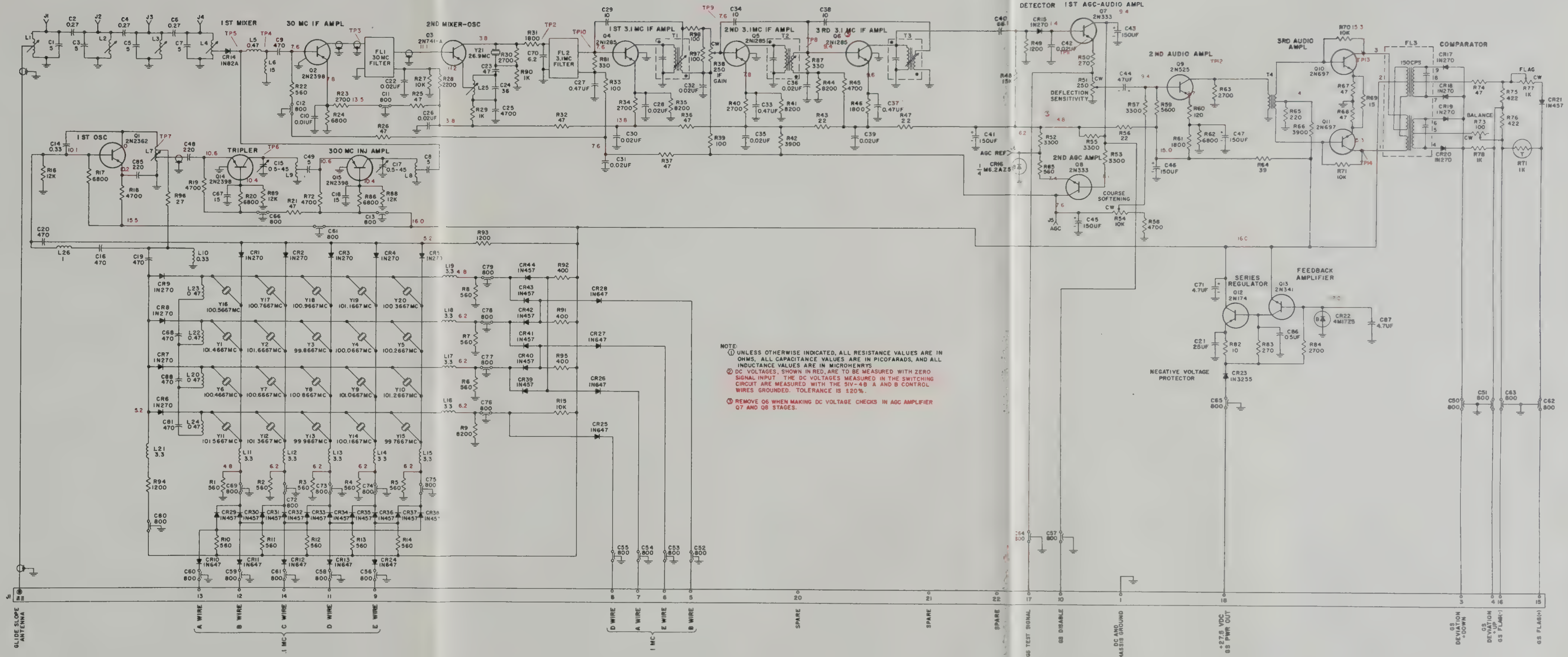
NOTES:

① SIGNAL LEVEL RANGES GIVEN ARE THOSE REQUIRED TO PRODUCE A MINIMUM CHANGE IN AGC VOLTAGE OF 1.0 VOLT DC. SIGNALS ARE COUPLED TO THE TEST POINTS THROUGH A 10,000 PF CAPACITOR AND A 6 DB PAD.

② AUDIO VOLTAGES, ±20%, ARE MEASURED WITH A STANDARD CENTERING SIGNAL INPUT TO THE 51V-4 AT A 700 MICROVOLT LEVEL.


FL3
R73
Q9
TP11
Q7
Q8
TP1
R51
Q6
R59
TP3
TP8
Q5
TP2
Q13
TP12
R77
TP13
Q10
Q11
TP14
Q12
TP9
R38
Q4
TP10


C17
C15
L4
TP6
TP7
L6
TP4
TP5
L5
L25
L1
L2
L3


1ST MIXER
30 MC IF AMPL
2ND MIXER-OSC
1ST 3.1MC IF AMPL
2ND 3.1MC IF AMPL
3RD 3.1MC IF AMPL
DETECTOR
1ST AGC-AUDIO AMPL
2ND AUDIO AMPL
3RD AUDIO AMPL
COMPARATOR
1ST OSC
TRIPLER
300 MC INJ AMPL
AGC REF
2ND AGC AMPL
DEFLECTION SENSITIVITY
COURSE SOFTENING
BALANCE
FLAG
SERIES REGULATOR
FEEDBACK AMPLIFIER
NEGATIVE VOLTAGE PROTECTOR
J1
GLIDE SLOPE ANTENNA
A WIRE
B WIRE
C WIRE
D WIRE
E WIRE
.1 MC
D WIRE
A WIRE
E WIRE
B WIRE
1 MC
SPARE
SPARE
SPARE
GS TEST SIGNAL
GS DISABLE
DC AND CHASSIS GROUND
+27.5 VDC GS PWR OUT
GS DEVIATION +DOWN
GS DEVIATION +UP
GS FLAG(-)
GS FLAG(+)

NOTE:

① UNLESS OTHERWISE INDICATED, ALL RESISTANCE VALUES ARE IN OHMS, ALL CAPACITANCE VALUES ARE IN PICOFARADS, AND ALL INDUCTANCE VALUES ARE IN MICROHENRYS

② DC VOLTAGES, SHOWN IN RED, ARE TO BE MEASURED WITH ZERO SIGNAL INPUT THE DC VOLTAGES MEASURED IN THE SWITCHING CIRCUIT ARE MEASURED WITH THE 51V-4B A AND B CONTROL WIRES GROUNDED. TOLERANCE IS ±20%.

③ REMOVE Q6 WHEN MAKING DC VOLTAGE CHECKS IN AGC AMPLIFIER Q7 AND Q8 STAGES.

51V-4B Trouble Shooting and Alignment Information
Figure 802

4. VOR/LOC UNIT TROUBLE-SHOOTING PROCEDURES.

A. Preliminary Steps.

(1) Fabricate the test jig according to the schematic diagram, figure 1002.

(2) Refer to figure 708, and connect P1 of the test jig to the 51RV-1 rear connector.

(3) Connect the 313N-3 (J2) to P4 and the 479V-2/3 to P2 on the test jig.

(4) Apply 26-volt, 400-cps and 27.5-volt, d-c power to the test jig power connectors and 115-volt, 60-cps power to the 479S-3 and 211-A.

(5) Connect the 211-A EXT MOD connector to the 479S-3 MOD OUTPUT connector and the 211-A RF OUT connector through 6-db pad (505-B) to test jig VOR/LOC ANT jack J3.

(6) Set the 313N-3 NAV frequency to 114.90 megacycles.

(7) Set the 211-A MOD switch to EXT, the OSC SEL switch to XTAL, the XTAL switch to 114.9 mc, adjust the 211-A frequency control to 114.9 mc, and tune to obtain a maximum indication on the RF MONITOR meter. Set the 211-A RF LEVEL control to obtain a red line indication on this meter.

(8) Ensure that the 479S-3 is properly calibrated, and set the FUNCTION SELECTOR to CAL.

(9) Set the 211-A and 479S-3 power switches to ON and the 313N-3 NAV power switch to PWR.

(10) Adjust the 211-A MOD LEVEL to obtain 30 percent modulation with the 479S-3 SPECIFIC SIGNAL SELECTOR set to 9960 FM and for 30 percent modulation with the selector set to 30~ VAR Ø.

(11) Connect the deviation meter to the VOR/LOC DEVIATION jack and the flag alarm to the VOR/LOC FLAG jack on the test jig.

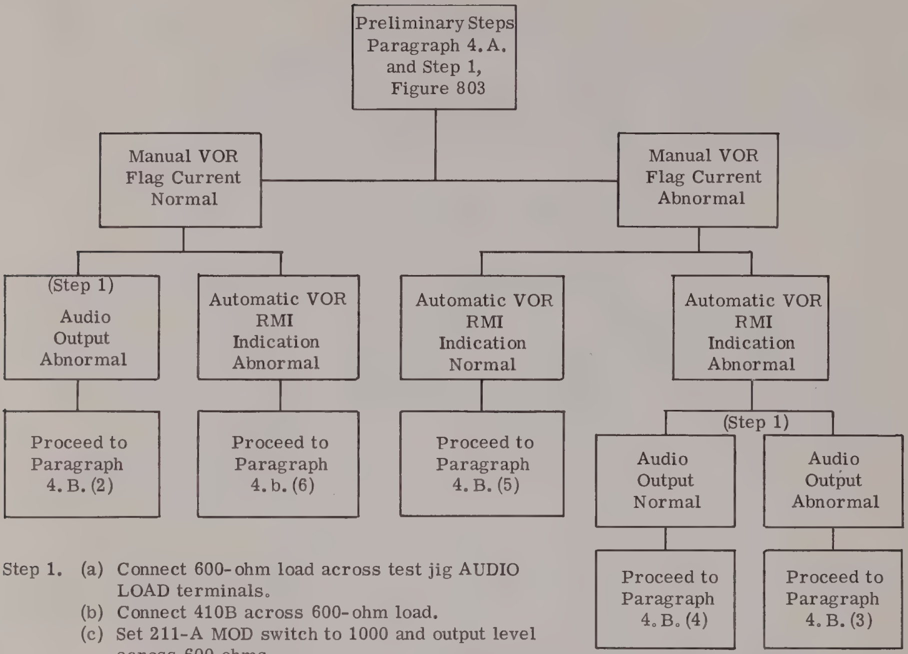
(12) Set the 479S-3 FUNCTION SELECTOR to ODR. The 211-A PERCENT modulation meter reading should be approximately 50.

(13) Set the 211-A output level to 1000 microvolts, the 479S-3 PHASE ANGLE SELECTOR to 180, and the 479V-2/3 BEARING DEGREES control to 0. Proceed to step 1 in figure 803.

(14) Perform step 2 in figure 803 to check localizer operation.

STEP	PROCEDURE	NORMAL INDICATION	IF ABNORMAL
1	Preliminary steps 4.A. (1) through (13).	Flag current 300 ±10 ua. RMI indicator 0 ±1 degree. Deviation current 0 ±3 ua. 479V-2/3 to-from meter full scale TO	Refer to figure 804. Refer to figure 804. Proceed to step 1(a). Make continuity checks in the to-from phase detector.
1(a)	Adjust 479S-3 PHASE ANGLE SELECTOR to obtain zero micro-ampere deviation current.	Zero microampere deviation current with PHASE ANGLE SELECTOR set to 180 degrees (or 0 degrees).	If deviation indicator reading is varying, check compressor circuits (paragraph 4.B.(8). If PHASE ANGLE SELECTOR is set to a reading other than 180 degrees (or 0 degrees), proceed to paragraph B.(9). If deviation current remains at one reading, make continuity checks in 344A-2 VOR phase detector.
2	Set controls as follows: 313N-3 NAV frequency and 211-A frequency to 110.10 mc; 211-A output level to 1000 microvolts; 479S-3 FUNCTION SELECTOR to TONE LOC, and TONE LOCALIZER control to 0.	Flag current 375 ±5 ua. Deviation current 0 ±3 ua. RMI pointer 3 o'clock position ±10 degrees.	Proceed to paragraph B.(11). Make continuity checks in localizer output circuitry. Check diode switches and circuitry of 344F-1 navigation disable circuits.
2(a)	Set 479S-3 TONE LOCALIZER control to 4DB.	Deviation current 90 ±3 ua.	Make continuity checks in localizer output circuitry.

51RV-1 Trouble-Shooting Procedures
Figure 803


Preliminary Steps Paragraph 4.A. and Step 1, Figure 803
Manual VOR Flag Current Normal
Manual VOR Flag Current Abnormal
(Step 1) Audio Output Abnormal
Automatic VOR RMI Indication Abnormal
Automatic VOR RMI Indication Normal
Automatic VOR RMI Indication Abnormal
Proceed to Paragraph 4.B.(2)
Proceed to Paragraph 4.b.(6)
Proceed to Paragraph 4.B.(5)
(Step 1)
Audio Output Normal
Audio Output Abnormal
Proceed to Paragraph 4.B.(4)
Proceed to Paragraph 4.B.(3)

Step 1.
(a) Connect 600-ohm load across test jig AUDIO LOAD terminals.
(b) Connect 410B across 600-ohm load.
(c) Set 211-A MOD switch to 1000 and output level across 600 ohms.
(d) Normal audio output across 600-ohm load should be 7 volts a-c.

Trouble-Isolation Chart
Figure 804

B. Sectional Trouble Shooting.

(1) General.

Perform the procedures in figure 803, and isolate the trouble to a section of the 51RV-1 as outlined in figure 804.

(2) 51X-4 Audio Section Trouble Shooting.

(a) Perform steps (1) through (9) of paragraph 4.A.

(b) Connect the 600-ohm load across test jig AUDIO LOAD terminals.

(c) Set the 211-A MOD switch to 1000 and the output level to 3 microvolts.

(d) Check the voltage at test points TP6 through TP10, and compare with the voltages given on the block diagram, figure 807.

(e) Localize the trouble in the defective stage by transistor substitution and voltage measurements. Compare the voltages obtained with those given on the schematic, figure 810.

(3) 51X-4 IF and RF Sections Trouble Shooting.

(a) Perform steps (1) through (7) of paragraph 4.A.

(b) Set the 211-A Power switch to ON and the 313N-3 NAV power switch to PWR.

(c) Measure the voltage at TP2. It should be +16 ±0.5 volts d-c. If not, make voltage checks on transistors Q7, Q8, and Q9.

NOTE: The regulator plate on which the transistors are mounted may be removed from the 51X-4 chassis to provide access to the transistor elements. The chassis serves as a heat sink for the regulator plate. Therefore, take precaution that the regulator plate and assembly do not overheat.

(d) Connect the d-c vtvm to test point TP11 (figure 809), and connect the r-f output of the HP-606 through a 6-db pad, 47-ohm resistor, and a 0.1-microfarad capacitor to test points TP12 through TP22.

(e) Set the output level of the HP-606 to the value listed at the frequency near each test point on the block diagram, figure 807.

(f) Connect the r-f output of the 211-A through the 6-db pad, 47-ohm resistor and 0.1-microfarad capacitor to test points TP22, TP23, and the antenna input. Adjust the 211-A output level to the value listed at the frequency near each test point.

(g) If the input required to obtain 3 volts at TP11 corresponds to the signal level listed, the stage is operating properly.

(h) Check the operation of the oscillator sections by connecting the r-f voltmeter to test points TP19 through TP22 and comparing the voltage readings with those given at the test points on figure 807.

(4) 344A-2 9960 FM Section Trouble Shooting.

(a) Perform the preliminary steps in paragraph 4.A.

(b) Circuit trace the 9960 FM circuitry with an oscilloscope connected through a 10,000-pf capacitor to test points TP1 through TP8. Compare waveforms obtained with those on the block diagram, figure 805.

(c) Substitute transistors, and make voltage measurements to locate the trouble to a faulty stage.

(5) 334A-2 Manual 30 CPS Reference and Variable Channel Trouble Shooting.

(a) Perform preliminary steps in paragraph 4.A.

(b) Set the 479S-3 FUNCTION SELECTOR to CAL and SPECIFIC SIGNAL SELECTOR to 9960 FM. Proceed to step (c) below if the flag current does not change. If the flag current drops to nearly zero, circuit trace the reference 30-cps stages by connecting the oscilloscope, through a 10,000-pf capacitor, to test points TP18 through TP24 (figures 805 and 806).

(c) Set the 479S-3 SPECIFIC SIGNAL SELECTOR to 30~ VAR Ø. Proceed to step (d) below if the flag current does not change. If the flag current drops to nearly zero, circuit trace the variable 30-cps stages by connecting the oscilloscope, through a 10,000-pf capacitor, to test points TP17 through TP24. See paragraph (8) below to check compressor circuit.

(d) Make continuity checks in the VOR phase detector.

(6) 334F-1 Automatic VOR Section Trouble Shooting.

(a) Perform the preliminary steps in paragraph 4.A.(1) through (13).

(b) Fabricate the test cable illustrated in figure 1004, and connect it between the 479V-3 30-cps connector and the 344F-1 connector J8. (Remove the bearing mechanism module). Set the 479V-2/3 BEARING DEGREES control to 90 degrees.

(c) Connect the deviation meter between 344F-1 CHOPPER jacks J1 and J2. If the deviation meter reading cannot be centered by adjusting the 479S-3 to 270 degrees ±4 degrees, check the VOR phase detector by making continuity checks.

(d) Adjust the 479S-3 PHASE ANGLE SELECTOR to ±10 degrees from 270 degrees. If the current reading on the deviation indicator is more than 150 microamperes, proceed to paragraph 4.B.(7).

(e) If the deviation meter reading remains centered (0 microampere) check the voltage at test points J3 (REF LEVEL) and J4 (VAR LEVEL). If either voltage is not approximately 4.5 VAC, check the respective faulty channel by circuit tracing at the test points given on figure 806. Refer to paragraph (8) below to check compressor circuit.

(7) 344F-1 Bearing Servo Amplifier Trouble Shooting.

(a) Perform steps (1) through (13) in paragraph 4.A., and set the 479S-3 PHASE ANGLE SELECTOR to 90 degrees.

(b) Locate the faulty stage by transistors substitution and/or d-c voltage checks.

(8) 344A-2 and 344F-1 Compressor Circuit Check.

(a) Open the emitter circuit to ground transistor Q13 or Q20 by unsoldering one lead of resistor R70 or R107, and connect a resistance decade between the emitter and ground.

(b) Place a short across level control R64 or R101, and adjust the resistor decade approximately 1.2K to obtain 4.5 volts a-c at level jack J3 or J4.

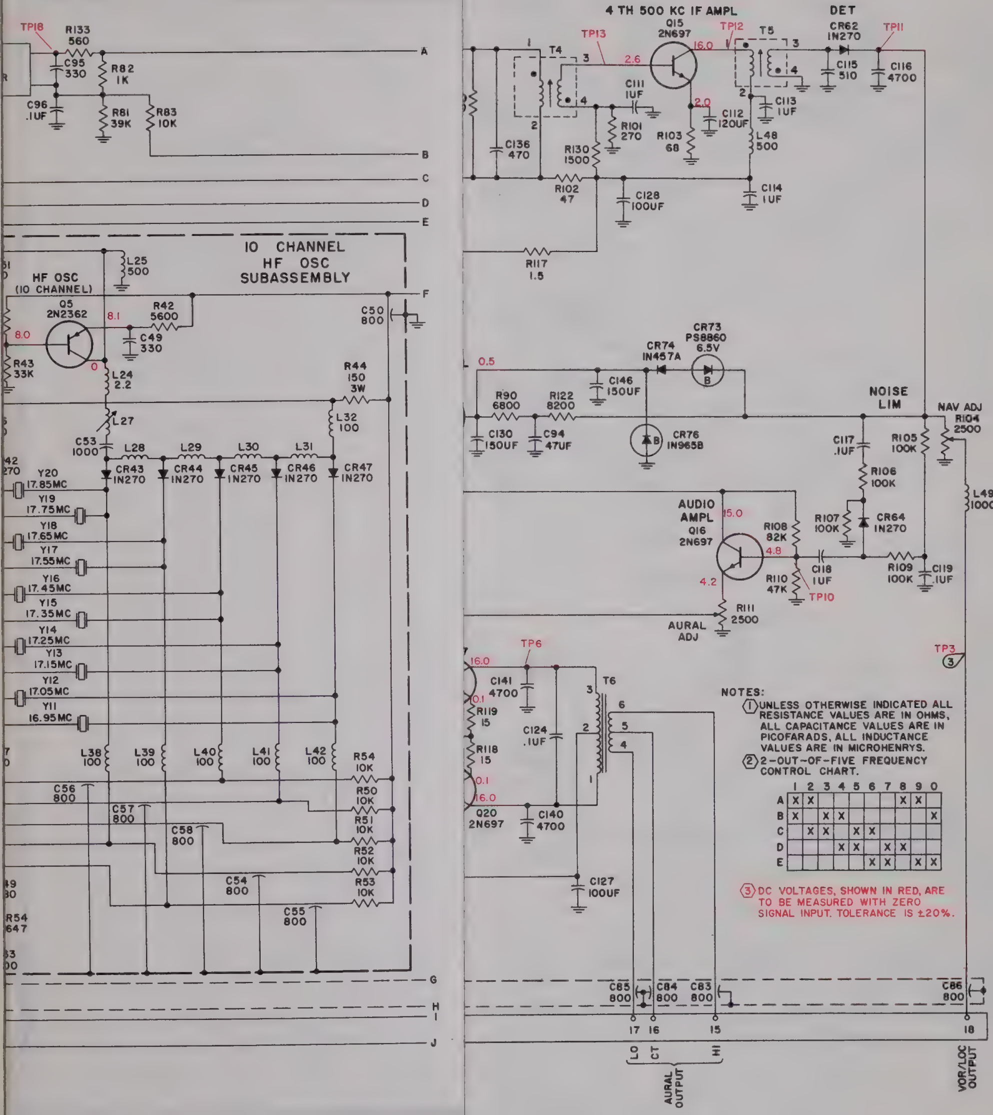
(c) If 4.5 volts is obtained at the level jack, make d-c voltage and continuity checks in the compressor circuitry to locate the fault.

(d) If 4.5 volts is not obtained, make voltage gain checks in the amplifier circuitry, and isolate the trouble further by making d-c voltage checks and substituting transistors.

(9) 344A-2 VOR Circuits Phase Check.

(a) Connect the oscilloscope to an a-c power source, turn the power on, and connect the X- and Y-inputs together. The scope should indicate an in-phase relationship.

(b) Perform steps (1) through (13) in paragraph 4.A.


4 TH 500 KC IF AMPL
DET
TP18
R133 560
C95 330
R82 1K
C96 .1UF
R81 39K
R83 10K
TP13
Q15 2N697
TP12
T5
CR62 1N270
TP11
T4
C111 1UF
C115 510
C116 4700
C113 1UF
C112 120UF
R101 270
R103 68
L48 500
C136 470
R130 1500
R102 47
C128 100UF
C114 1UF
R117 1.5
10 CHANNEL HF OSC SUBASSEMBLY
HF OSC (10 CHANNEL)
L25 500
Q5 2N2362
R42 5600
C49 330
R43 33K
L24 2.2
C50 800
R44 150 3W
L27
L32 100
C53 1000
L28
L29
L30
L31
CR43 1N270
CR44 1N270
CR45 1N270
CR46 1N270
CR47 1N270
Y20 17.85MC
Y19 17.75MC
Y18 17.65MC
Y17 17.55MC
Y16 17.45MC
Y15 17.35MC
Y14 17.25MC
Y13 17.15MC
Y12 17.05MC
Y11 16.95MC
L38 100
L39 100
L40 100
L41 100
L42 100
R54 10K
R50 10K
R51 10K
R52 10K
R53 10K
C56 800
C57 800
C58 800
C54 800
C55 800
CR73 PS8860 6.5V
CR74 1N457A
C146 150UF
R90 6800
R122 8200
C130 150UF
C94 47UF
CR76 1N965B
NOISE LIM
NAV ADJ R104 2500
C117 .1UF
R105 100K
R106 100K
L49 1000
AUDIO AMPL Q16 2N697
R108 82K
R107 100K
CR64 1N270
C118 1UF
R109 100K
C119 .1UF
R110 47K
TP10
R111 2500
AURAL ADJ
TP6
TP3
C141 4700
T6
R119 15
R118 15
C124 .1UF
Q20 2N697
C140 4700
C127 100UF
C85 800
C84 800
C83 800
C86 800
A
B
C
D
E
F
G
H
I
J
17
16
15
18
LO
CT
HI
AURAL OUTPUT
VOR/LOC OUTPUT

NOTES:

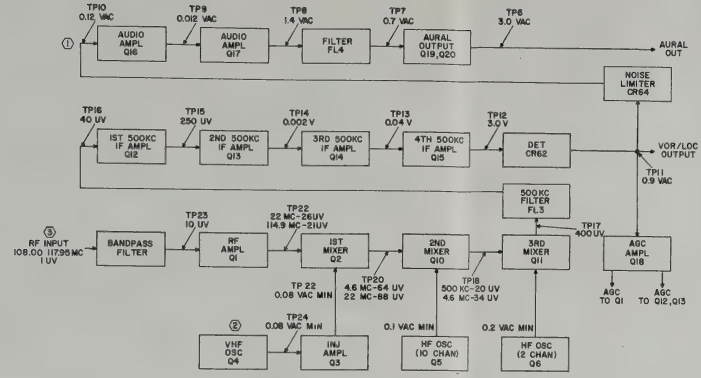
① UNLESS OTHERWISE INDICATED ALL RESISTANCE VALUES ARE IN OHMS, ALL CAPACITANCE VALUES ARE IN PICOFARADS, ALL INDUCTANCE VALUES ARE IN MICROHENRYS.

② 2-OUT-OF-FIVE FREQUENCY CONTROL CHART.

	1	2	3	4	5	6	7	8	9	0
A	X	X						X	X	
B	X		X	X						X
C		X	X		X	X				
D				X	X		X	X		
E						X	X		X	X

③ DC VOLTAGES, SHOWN IN RED, ARE TO BE MEASURED WITH ZERO SIGNAL INPUT. TOLERANCE IS ±20%.

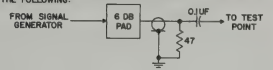
ceiver, Schematic Diagram
igure 810


TP10
0.12 VAC
TP9
0.012 VAC
TP8
1.4 VAC
TP7
0.7 VAC
TP6
3.0 VAC
①
AUDIO AMPL Q16
AUDIO AMPL Q17
FILTER FL4
AURAL OUTPUT Q19,Q20
AURAL OUT
NOISE LIMITER CR64
TP16
40 UV
TP15
250 UV
TP14
0.002 V
TP13
0.04 V
TP12
3.0 V
1ST 500KC IF AMPL Q12
2ND 500KC IF AMPL Q13
3RD 500KC IF AMPL Q14
4TH 500KC IF AMPL Q15
DET CR62
VOR/LOC OUTPUT
TP11
0.9 VAC
500KC FILTER FL3
③
RF INPUT
108.00 117.95MC
1 UV
BANDPASS FILTER
TP23
10 UV
RF AMPL Q1
TP22
22 MC-26UV
114.9 MC-21UV
1ST MIXER Q2
2ND MIXER Q10
3RD MIXER Q11
TP17
400 UV
AGC AMPL Q18
AGC TO Q1
AGC TO Q12,Q13
TP 22
0.08 VAC MIN
TP20
4.6 MC-64 UV
22 MC-88 UV
TP18
500 KC-20 UV
4.6 MC-34 UV
②
TP24
0.08 VAC MIN
0.1 VAC MIN
0.2 VAC MIN
VHF OSC Q4
INJ AMPL Q3
HF OSC (10 CHAN) Q5
HF OSC (2 CHAN) Q6

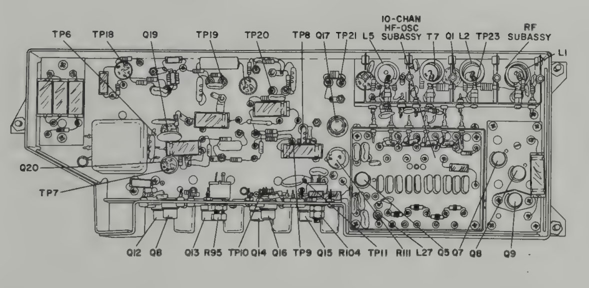
① AUDIO VOLTAGES ARE TYPICAL VALUES MEASURED WITH AN RF INPUT SIGNAL LEVEL OF 2.5 MICROVOLTS, MODULATED 30% WITH 1000 CPS, AND COUPLED THROUGH A 6 DB PAD.

② OSCILLATOR-INJECTION VOLTAGES ARE TYPICAL VALUES MEASURED WITH A BOONTON 91C RF VOLTMETER

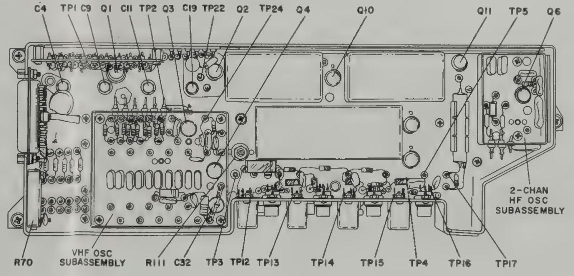
③ RF SIGNAL LEVELS GIVEN ARE TYPICAL VALUES REQUIRED TO OBTAIN 3 VDC AT TP11. THESE FREQUENCIES ARE COUPLED FROM A HEWLETT PACKARD 606 SIGNAL GENERATOR OR A BOONTON 211-A SIGNAL GENERATOR THROUGH THE FOLLOWING:


FROM SIGNAL GENERATOR
6 DB PAD
0.1UF
TO TEST POINT
47

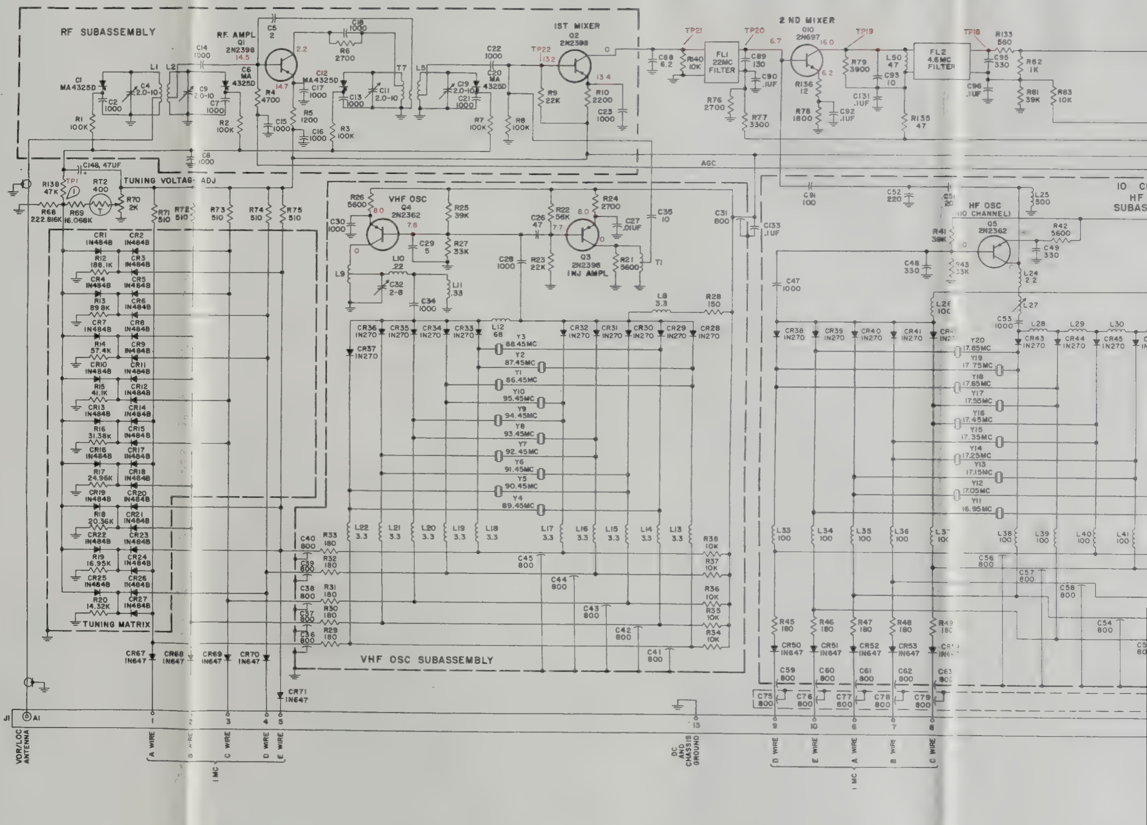
51X-4 Stage Gain, Block Diagram
Figure 807

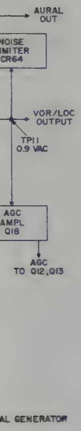

TP6
TP18
Q19
TP19
TP20
TP8
Q17
TP21
L5
10-CHAN HF-OSC SUBASSY
T7
Q1
L2
TP23
RF SUBASSY
L1
Q20
TP7
Q12
Q8
Q13
R95
TP10
Q14
Q16
TP9
Q15
R104
TP11
R111
L27
Q5
Q7
Q8
Q9

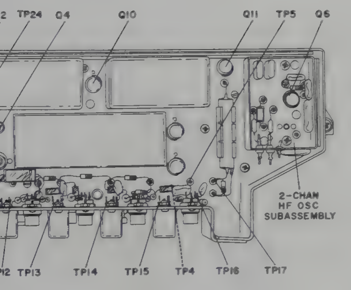
51X-4 Right-Side View
Figure 808


C4
TP1
C9
Q1
C11
TP2
Q3
C19
TP22
Q2
TP24
Q4
Q10
Q11
TP5
Q6
2-CHAN HF OSC SUBASSEMBLY
R70
VHF OSC SUBASSEMBLY
R111
C32
TP3
TP12
TP13
TP14
TP15
TP4
TP16
TP17

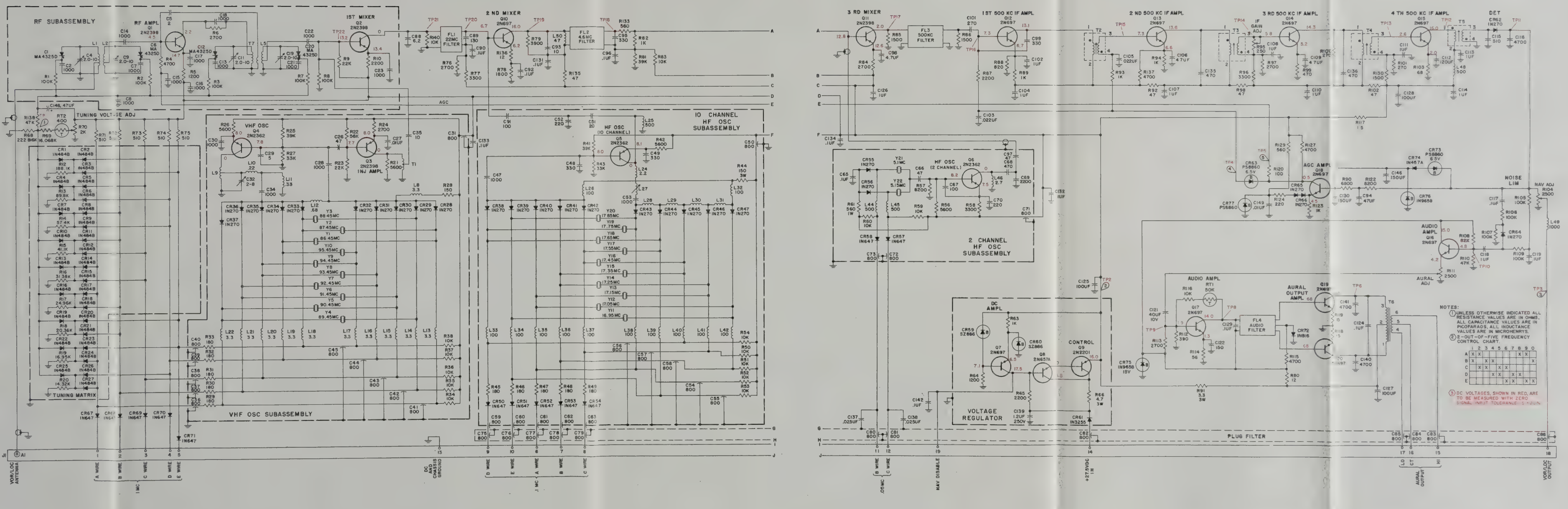
51X-4 Left-Side View
Figure 809


RF SUBASSEMBLY
RF. AMPL
Q1
2N2398
C1
MA4325D
C2
1000
C4
2.0-10
L1
L2
C14
1000
C9
2.0-10
C7
1000
C6
MA
4325D
C5
2
R4
4700
C15
1000
R5
1200
C16
1000
R1
100K
R2
100K
C8
1000
C17
1000
C12
MA4325D
R6
2700
C18
1000
C13
1000
C11
2.0-10
T7
R3
100K
L5
C19
2.0-10
C21
1000
C20
MA
4325D
C22
1000
R7
100K
R8
100K
1ST MIXER
Q2
2N2398
TP22
R9
22K
R10
2200
C23
1000
C148, 47UF
TUNING VOLTAGE ADJ
R138
47K
TP1
RT2
400
R68
222.816K
R69
16.068K
R70
2K
R71
510
R72
510
R73
510
R74
510
R75
510
TUNING MATRIX
VHF OSC
Q4
2N2362
R26
5600
C30
1000
R25
39K
C29
5
R27
33K
L9
L10
.22
C32
2-8
C34
1000
L11
.33
C26
47
R22
56K
R24
2700
C27
.01UF
C28
1000
R23
22K
Q3
2N2398
INJ AMPL
R21
5600
C35
10
T1
VHF OSC SUBASSEMBLY
C31
800
C133
.1UF
C88
6.2
R140
10K
TP21
FL1
22MC
FILTER
TP20
C89
130
C90
.1UF
R76
2700
R77
3300
2 ND MIXER
Q10
2N697
R136
12
R78
1800
C92
.1UF
TP19
R79
3900
C131
.1UF
C93
10
L50
47
R135
47
FL2
4.6MC
FILTER
TP18
R133
560
C95
330
C96
.1UF
R82
1K
R81
39K
R83
10K
AGC
C91
100
C52
220
C51
20
HF OSC
(10 CHANNEL)
Q5
2N2362
L25
500
R41
39K
R42
5600
C49
330
C48
330
L24
2.2
C47
1000
C53
1000
J1
A1
VOR/LOC ANTENNA
A WIRE
B WIRE
C WIRE
D WIRE
E WIRE
1 MC
CR67
1N647
CR68
1N647
CR69
1N647
CR70
1N647
CR71
1N647
DC AND CHASSIS GROUND
D WIRE
E WIRE
A WIRE
B WIRE
C WIRE
1 MC
Y3
88.45MC
Y2
87.45MC
Y1
86.45MC
Y10
95.45MC
Y9
94.45MC
Y8
93.45MC
Y7
92.45MC
Y6
91.45MC
Y5
90.45MC
Y4
89.45MC
Y20
17.85MC
Y19
17.75MC
Y18
17.65MC
Y17
17.55MC
Y16
17.45MC
Y15
17.35MC
Y14
17.25MC
Y13
17.15MC
Y12
17.05MC
Y11
16.95MC


AURAL OUT
NOISE LIMITER CR64
VOR/LOC OUTPUT
TP11 0.9 VAC
AGC AMPL Q18
AGC TO Q12,Q13
AL GENERATOR


2
TP24
C4
Q10
Q11
TP5
Q6
2-CHAN HF OSC SUBASSEMBLY
2
TP13
TP14
TP15
TP4
TP16
TP17

-4 Left-Side View
Figure 809


RF SUBASSEMBLY
RF AMPL Q1 2N2398
1ST MIXER Q2 2N2398
TUNING VOLTAGE ADJ
TUNING MATRIX
VHF OSC Q4 2N2362
INJ AMPL Q3 2N2398
VHF OSC SUBASSEMBLY
FL1 22MC FILTER
2 ND MIXER Q10 2N697
FL2 4.6MC FILTER
10 CHANNEL HF OSC SUBASSEMBLY
HF OSC (10 CHANNEL) Q5 2N2362
AGC
VOR/LOC ANTENNA
DC AND CHASSIS GROUND
3 RD MIXER Q11 2N2398
FL3 500KC FILTER
1 ST 500 KC IF AMPL Q12 2N697
2 ND 500 KC IF AMPL Q13 2N697
IF GAIN ADJ
3 RD 500 KC IF AMPL Q14 2N697
4 TH 500 KC IF AMPL Q15 2N697
DET
AGC AMPL Q18 2N697
NOISE LIM
NAV ADJ
AUDIO AMPL Q16 2N697
AURAL ADJ
HF OSC (2 CHANNEL) Q6 2N2362
2 CHANNEL HF OSC SUBASSEMBLY
AUDIO AMPL Q17 2N697
FL4 AUDIO FILTER
AURAL OUTPUT AMPL
DC AMPL
CONTROL Q9 2N2201
VOLTAGE REGULATOR
PLUG FILTER
NAV DISABLE
+27.5VDC IN
AURAL OUTPUT
VOR/LOC OUTPUT

NOTES:

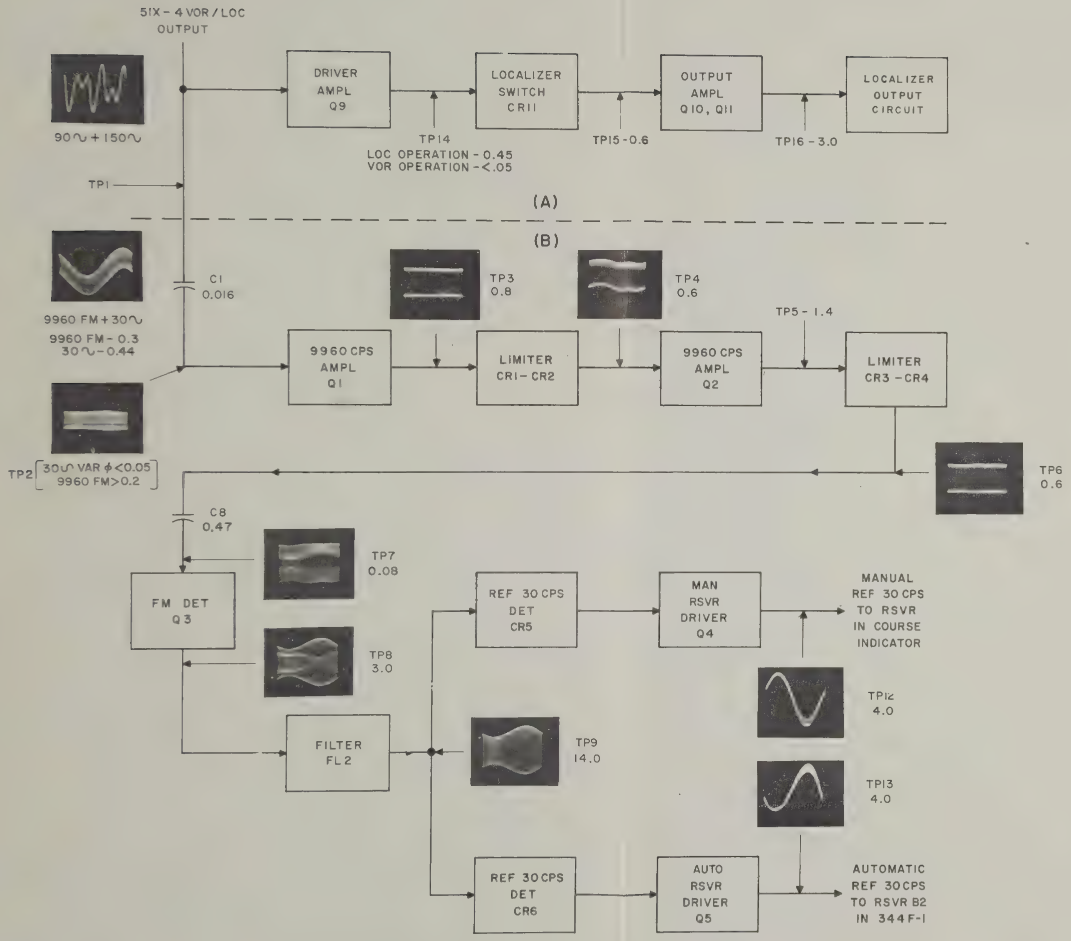
① UNLESS OTHERWISE INDICATED ALL RESISTANCE VALUES ARE IN OHMS, ALL CAPACITANCE VALUES ARE IN PICOFARADS, ALL INDUCTANCE VALUES ARE IN MICROHENRYS.

② 2-OUT-OF-FIVE FREQUENCY CONTROL CHART.

	1	2	3	4	5	6	7	8	9	0
A	X	X						X	X	
B	X		X	X						X
C		X	X		X	X				
D				X	X		X	X		
E						X	X		X	X

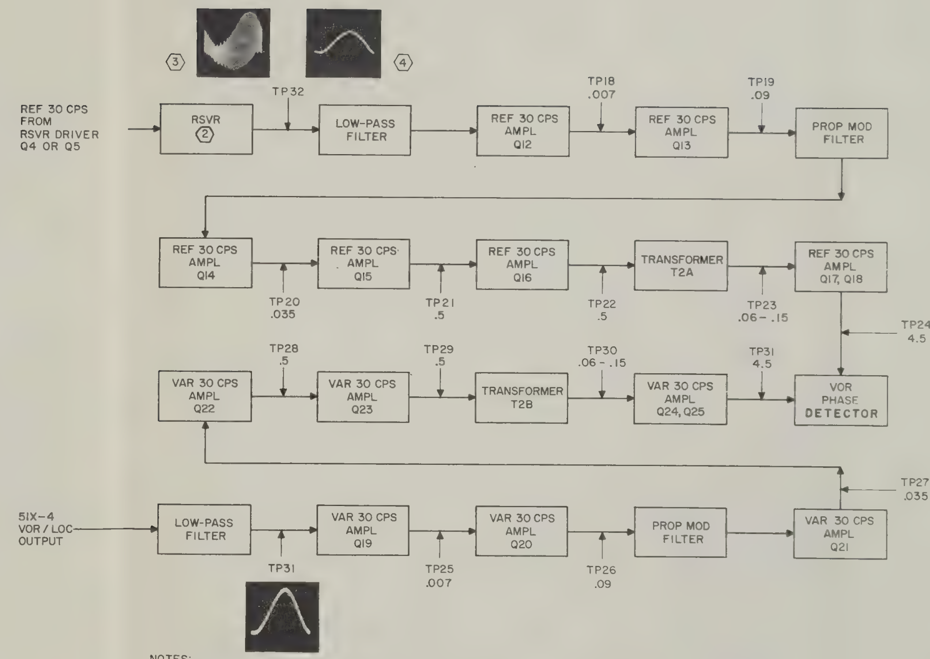
③ DC VOLTAGES, SHOWN IN RED, ARE TO BE MEASURED WITH ZERO SIGNAL INPUT. TOLERANCE IS ±20%.

51X-4 VOR/LOC Receiver, Schematic Diagram
Figure 810


51X-4 VOR/LOC OUTPUT
90∿+150∿
TP1
DRIVER AMPL Q9
TP14
LOC OPERATION - 0.45
VOR OPERATION - <.05
LOCALIZER SWITCH CR11
TP15-0.6
OUTPUT AMPL Q10, Q11
TP16 - 3.0
LOCALIZER OUTPUT CIRCUIT
(A)
(B)
C1 0.016
9960 FM+30∿
9960 FM - 0.3
30∿-0.44
TP3 0.8
TP4 0.6
TP5 - 1.4
9960 CPS AMPL Q1
LIMITER CR1-CR2
9960 CPS AMPL Q2
LIMITER CR3-CR4
TP2 30∿ VAR ϕ<0.05 9960 FM>0.2
TP6 0.6
C8 0.47
TP7 0.08
FM DET Q3
TP8 3.0
REF 30 CPS DET CR5
MAN RSVR DRIVER Q4
MANUAL REF 30 CPS TO RSVR IN COURSE INDICATOR
TP12 4.0
FILTER FL2
TP9 14.0
TP13 4.0
REF 30 CPS DET CR6
AUTO RSVR DRIVER Q5
AUTOMATIC REF 30 CPS TO RSVR B2 IN 344F-1

NOTE: (1) UNLESS INDICATED ALL TEST POINT READINGS ARE AC VOLTAGES MEASURED WITH A BALLANTINE 310A (±20%)

334A-2 9960 FM Stage Gain, Block Diagram
Figure 805


(3)
(4)
REF 30 CPS FROM RSVR DRIVER Q4 OR Q5
RSVR (2)
TP32
LOW-PASS FILTER
REF 30 CPS AMPL Q12
TP18 .007
REF 30 CPS AMPL Q13
TP19 .09
PROP MOD FILTER
REF 30 CPS AMPL Q14
TP20 .035
REF 30 CPS AMPL Q15
TP21 .5
REF 30 CPS AMPL Q16
TP22 .5
TRANSFORMER T2A
TP23 .06 - .15
REF 30 CPS AMPL Q17, Q18
TP24 4.5
TP28 .5
TP29 .5
TP30 .06 - .15
TP31 4.5
VAR 30 CPS AMPL Q22
VAR 30 CPS AMPL Q23
TRANSFORMER T2B
VAR 30 CPS AMPL Q24, Q25
VOR PHASE DETECTOR
TP27 .035
51X-4 VOR/LOC OUTPUT
LOW-PASS FILTER
TP31
VAR 30 CPS AMPL Q19
TP25 .007
VAR 30 CPS AMPL Q20
TP26 .09
PROP MOD FILTER
VAR 30 CPS AMPL Q21

NOTES:

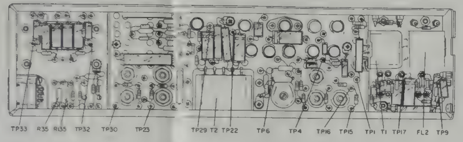
(1) ALL TEST POINT READINGS ARE AC VOLTAGES MEASURED WITH A BALLANTINE 310A VTVM. (±20%)

(2) 344A-2 RESOLVER IS IN THE 479V-3.
344F-1 RESOLVER IS SYNCHRO B2 IN BEARING MECHANISM MODULE.

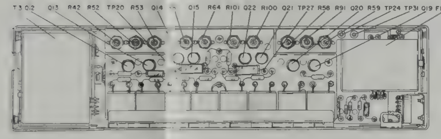
(3) 479V-3 BEARING DEGREES CONTROL SET TO 210°.

(4) 479V-3 BEARING DEGREES CONTROL SET TO 120°.

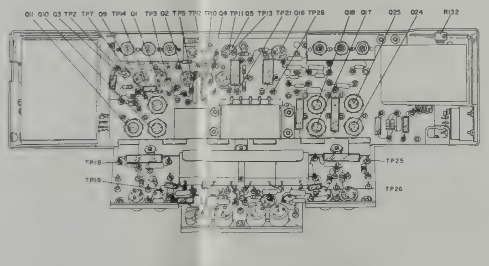
344A-2/344F-1 Reference and Variable 30-CPS
Stage Gain, Block Diagram
Figure 806


TP33
R35
R135
TP32
TP30
TP23
TP29
T2
TP22
TP6
TP4
TP16
TP15
TP1
T1
TP17
FL2
TP9

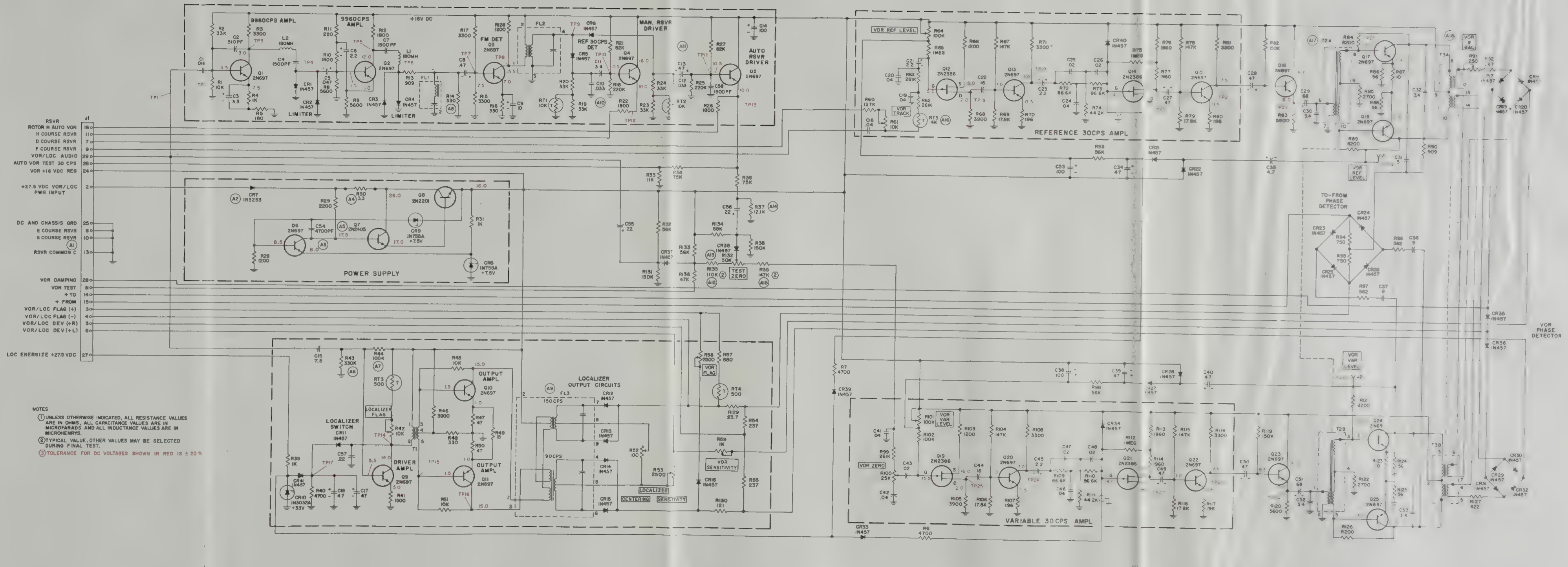
344A-2 Left-Side View
Figure 811


T3
Q12
Q13
R42
R52
TP20
R53
Q14
Q15
R64
R101
Q22
R100
Q21
TP27
R58
R91
Q20
R59
TP24
TP31
Q19
FL3

344A-2 Right-Side View
Figure 812


Q11
Q10
Q3
TP2
TP7
Q9
TP14
Q1
TP3
Q2
TP5
TP10
Q4
TP11
Q5
TP13
TP21
Q16
TP28
Q18
Q17
Q25
Q24
R132
TP18
TP19
TP25
TP26

344A-2 Left-Side View, Panel Folded Back
Figure 813


J1
RSVR
ROTOR H AUTO VOR 16
H COURSE RSVR 11
D COURSE RSVR 7
F COURSE RSVR 9
VOR/LOC AUDIO 29
AUTO VOR TEST 30 CPS 26
VOR +16 VDC REG 24
+27.5 VDC VOR/LOC PWR INPUT 2
DC AND CHASSIS GRD 25
E COURSE RSVR 8
G COURSE RSVR 10
RSVR COMMON C 13
VOR DAMPING 28
VOR TEST 31
+ TO 14
+ FROM 15
VOR/LOC FLAG (+) 3
VOR/LOC FLAG (-) 4
VOR/LOC DEV (+R) 5
VOR/LOC DEV (+L) 6
LOC ENERGIZE +27.5 VDC 27
TP1
9960CPS AMPL
9960CPS AMPL
+16V DC
FM DET
REF 30CPS DET
MAN. RSVR DRIVER
AUTO RSVR DRIVER
LIMITER
LIMITER
POWER SUPPLY
VOR REF LEVEL
REFERENCE 30CPS AMPL
TO-FROM PHASE DETECTOR
VOR PHASE DETECTOR
VOR TRACK
VOR ZERO
VOR VAR LEVEL
VARIABLE 30CPS AMPL
LOCALIZER SWITCH
LOCALIZER FLAG
DRIVER AMPL
OUTPUT AMPL
OUTPUT AMPL
LOCALIZER OUTPUT CIRCUITS
150CPS
90CPS
LOCALIZER CENTERING
LOCALIZER SENSITIVITY
VOR FLAG
VOR SENSITIVITY
TEST ZERO
VOR BAL
REF LEVEL
VOR VAR LEVEL

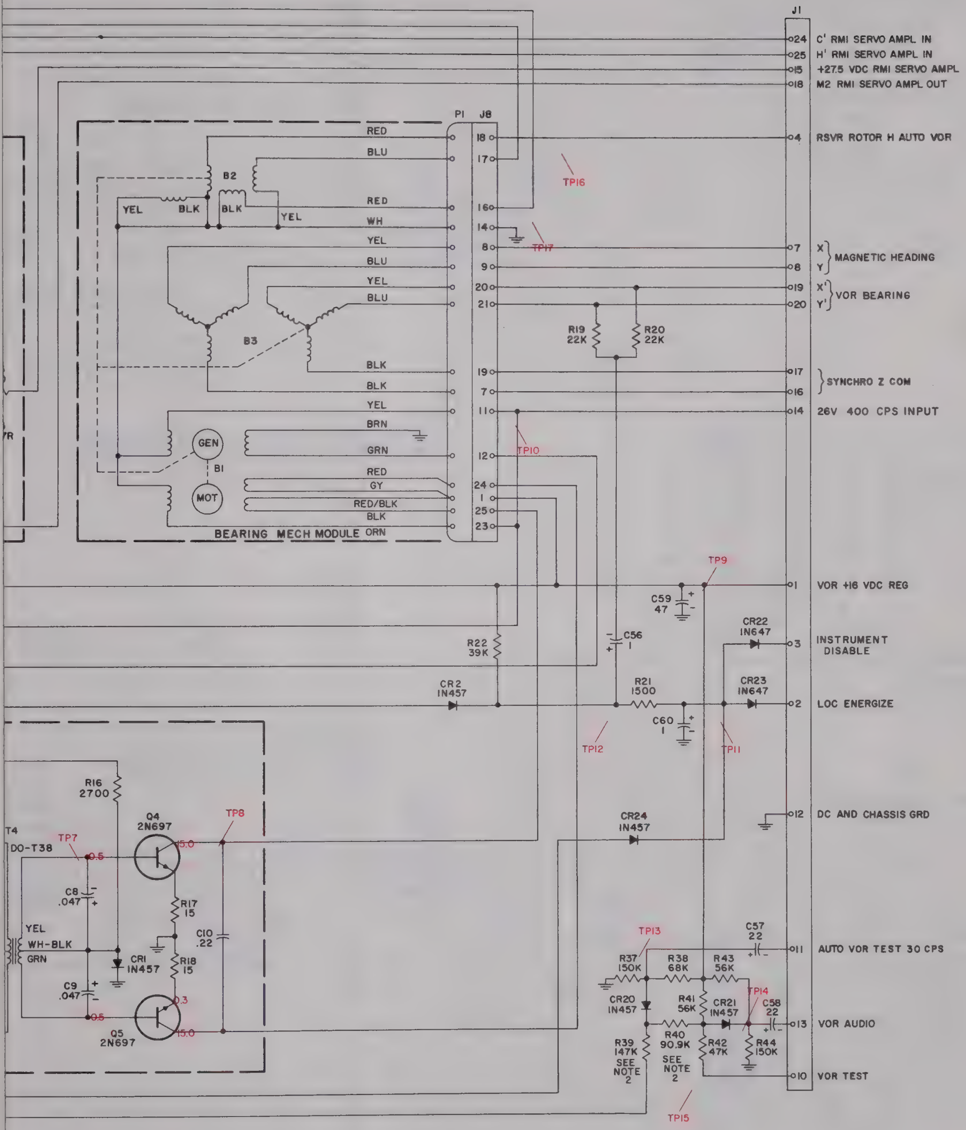
NOTES

① UNLESS OTHERWISE INDICATED, ALL RESISTANCE VALUES ARE IN OHMS, ALL CAPACITANCE VALUES ARE IN MICROFARADS AND ALL INDUCTANCE VALUES ARE IN MICROHENRYS.

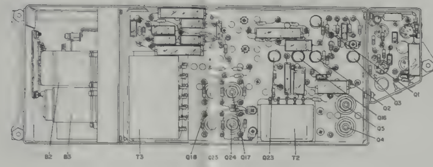
② TYPICAL VALUE. OTHER VALUES MAY BE SELECTED DURING FINAL TEST.

③ TOLERANCE FOR DC VOLTAGES SHOWN IN RED IS ± 20 %

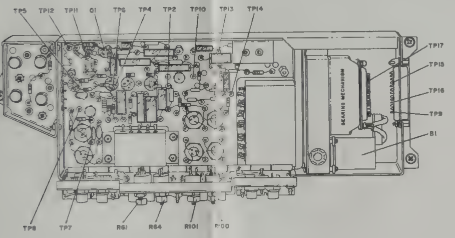
344A-2 Manual VOR/LOC Instrumentation Unit, Schematic Diagram
Figure 814


J1
24 C' RMI SERVO AMPL IN
25 H' RMI SERVO AMPL IN
15 +27.5 VDC RMI SERVO AMPL
18 M2 RMI SERVO AMPL OUT
P1
J8
RED
BLU
B2
YEL
BLK
BLK
YEL
RED
WH
YEL
BLU
YEL
BLU
B3
BLK
BLK
YEL
BRN
GEN
B1
GRN
MOT
RED
GY
RED/BLK
BLK
ORN
BEARING MECH MODULE
18
17
16
14
8
9
20
21
19
7
11
12
24
1
25
23
TP16
TP17
TP10
4 RSVR ROTOR H AUTO VOR
7 X
8 Y
MAGNETIC HEADING
19 X'
20 Y'
VOR BEARING
R19 22K
R20 22K
17
16
SYNCHRO Z COM
14 26V 400 CPS INPUT
TP9
1 VOR +16 VDC REG
C59 47
R22 39K
C56 1
CR22 1N647
3 INSTRUMENT DISABLE
CR2 1N457
R21 1500
CR23 1N647
2 LOC ENERGIZE
C60 1
TP12
TP11
12 DC AND CHASSIS GRD
R16 2700
Q4 2N697
TP8
TP7
T4
DO-T38
0.5
15.0
C8 .047
R17 15
C10 .22
YEL
WH-BLK
GRN
CR1 1N457
R18 15
C9 .047
0.3
0.5
15.0
Q5 2N697
CR24 1N457
TP13
C57 22
11 AUTO VOR TEST 30 CPS
R37 150K
R38 68K
R43 56K
CR20 1N457
R41 56K
CR21 1N457
TP14
C58 22
13 VOR AUDIO
R39 147K SEE NOTE 2
R40 90.9K SEE NOTE 2
R42 47K
R44 150K
10 VOR TEST
TP15
7R

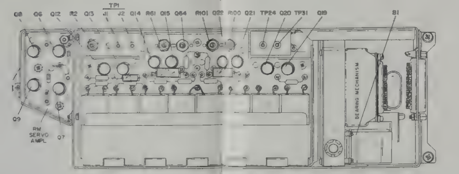
344F-1 Automatic VOR Instrumentation Unit, Schematic Diagram
Figure 818


S2
B5
T3
Q18
Q25
Q24
Q17
Q23
T2
Q1
Q2
Q3
Q4
Q5
Q6

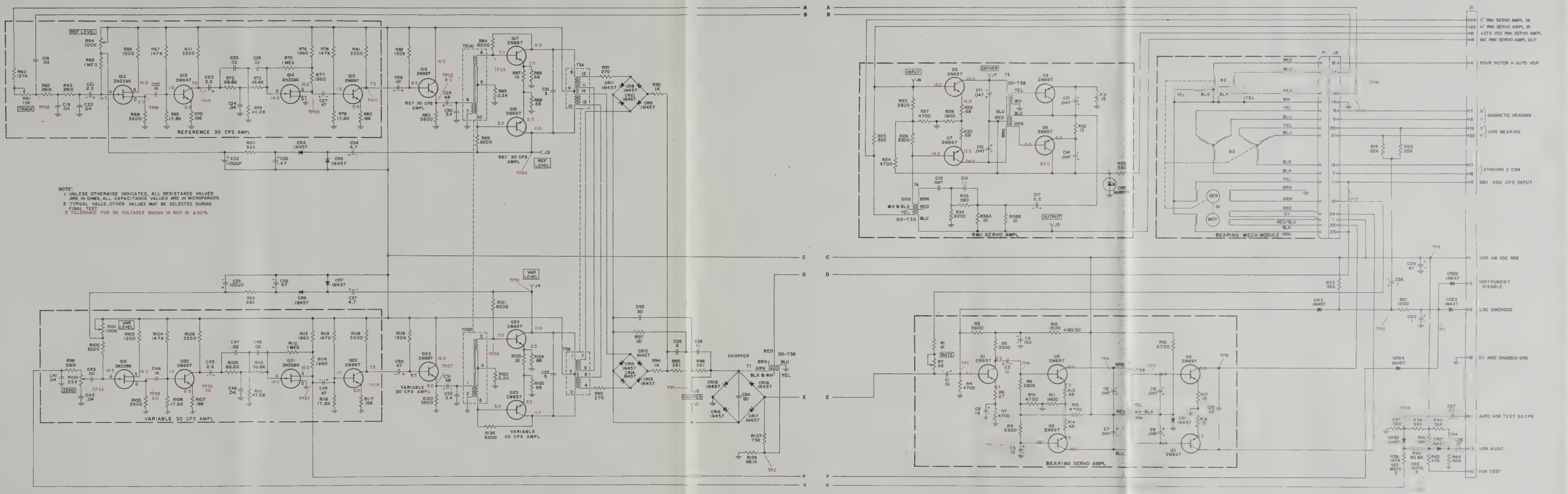
344F-1 Left-Side View
Figure 815


TP5
TP12
TP11
Q1
TP6
TP4
TP2
TP10
TP13
TP14
TP17
TP15
TP16
TP9
B1
TP8
TP7
R61
R64
R101
R100

344F-1 Left-Side View, Panel Folded Back
Figure 816

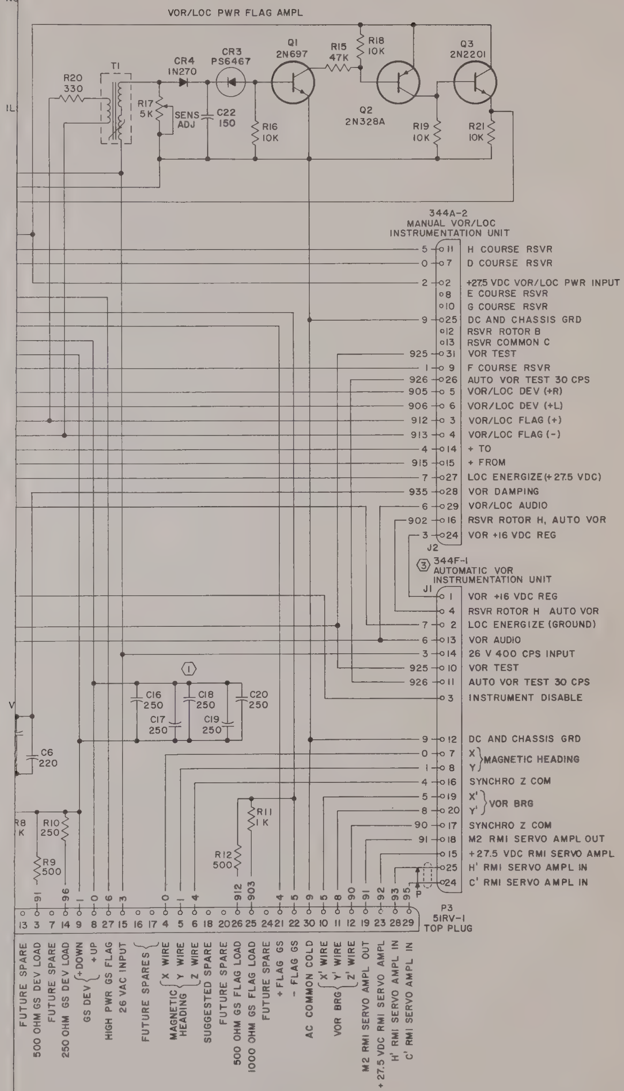

TP1
B1
Q9
RMI SERVO AMPL

344F-1 Right-Side View
Figure 817

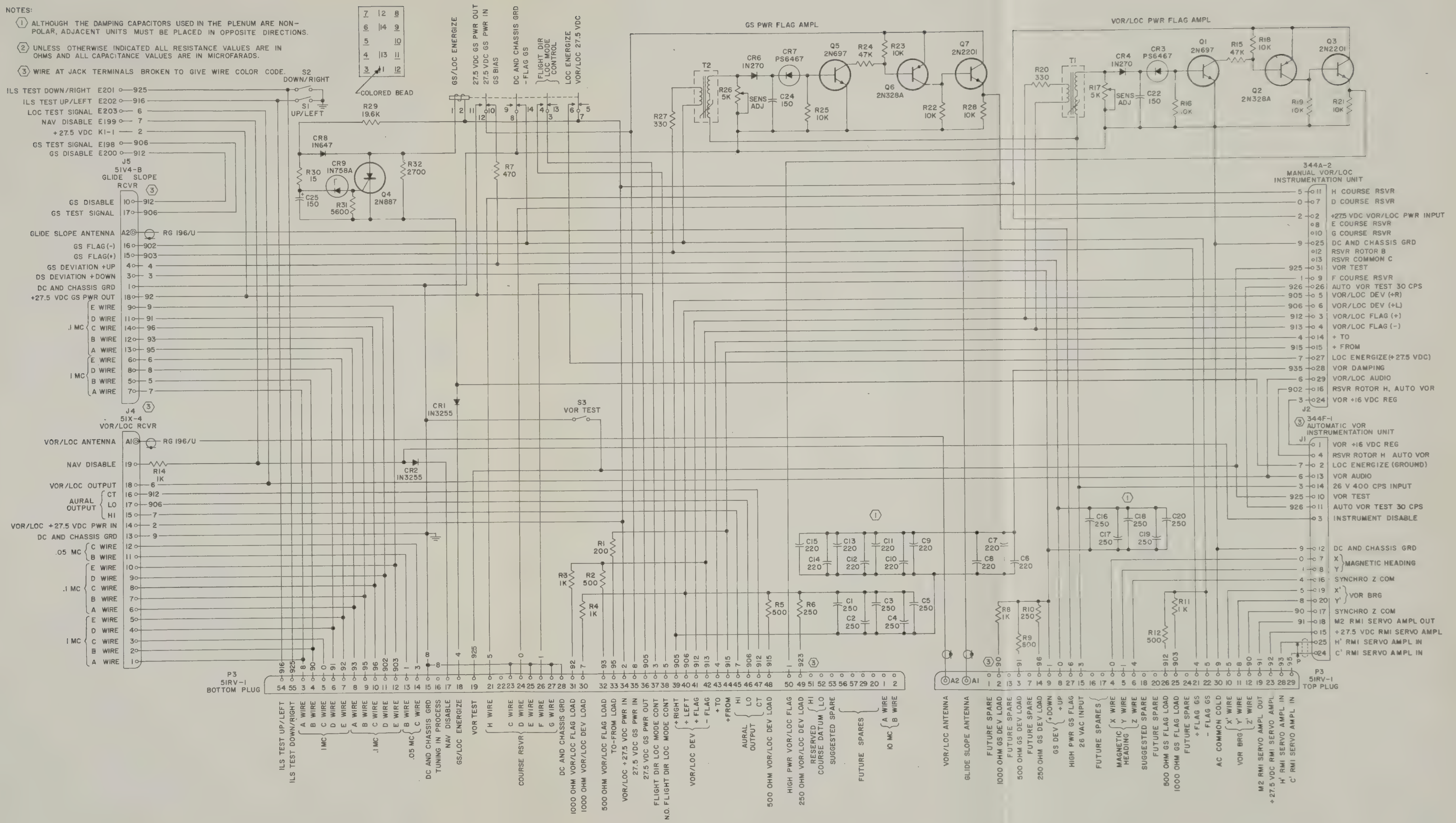

REF LEVEL
TRACK
REFERENCE 30 CPS AMPL
REF 30 CPS AMPL
VAR LEVEL
ZERO
VARIABLE 30 CPS AMPL
CHOPPER
INPUT
DRIVER
OUTPUT
RMI SERVO AMPL
BEARING MECH MODULE
RATE
BEARING SERVO AMPL
J1
C' RMI SERVO AMPL IN
H' RMI SERVO AMPL IN
+275 VDC RMI SERVO AMPL
M2 RMI SERVO AMPL OUT
RSVR ROTOR H AUTO VOR
MAGNETIC HEADING
VOR BEARING
SYNCHRO Z COM
26V 400 CPS INPUT
VOR +16 VDC REG
INSTRUMENT DISABLE
LOC ENERGIZE
DC AND CHASSIS GRD
AUTO VOR TEST 30 CPS
VOR AUDIO
VOR TEST

NOTE:
1. UNLESS OTHERWISE INDICATED, ALL RESISTANCE VALUES ARE IN OHMS, ALL CAPACITANCE VALUES ARE IN MICROFARADS.
2 TYPICAL VALUE, OTHER VALUES MAY BE SELECTED DURING FINAL TEST.
3. TOLERANCE FOR DC VOLTAGES SHOWN IN RED IS ±20%

344F-1 Automatic VOR Instrumentation Unit, Schematic Diagram
Figure 818


VOR/LOC PWR FLAG AMPL
T1
R20 330
CR4 1N270
CR3 PS6467
Q1 2N697
R15 47K
R18 10K
Q3 2N2201
R17 5K
SENS ADJ
C22 150
R16 10K
Q2 2N328A
R19 10K
R21 10K
344A-2 MANUAL VOR/LOC INSTRUMENTATION UNIT
H COURSE RSVR
D COURSE RSVR
+27.5 VDC VOR/LOC PWR INPUT
E COURSE RSVR
G COURSE RSVR
DC AND CHASSIS GRD
RSVR ROTOR B
RSVR COMMON C
VOR TEST
F COURSE RSVR
AUTO VOR TEST 30 CPS
VOR/LOC DEV (+R)
VOR/LOC DEV (+L)
VOR/LOC FLAG (+)
VOR/LOC FLAG (-)
+ TO
+ FROM
LOC ENERGIZE (+27.5 VDC)
VOR DAMPING
VOR/LOC AUDIO
RSVR ROTOR H, AUTO VOR
VOR +16 VDC REG
J2
③ 344F-1 AUTOMATIC VOR INSTRUMENTATION UNIT
J1
VOR +16 VDC REG
RSVR ROTOR H AUTO VOR
LOC ENERGIZE (GROUND)
VOR AUDIO
26 V 400 CPS INPUT
VOR TEST
AUTO VOR TEST 30 CPS
INSTRUMENT DISABLE
DC AND CHASSIS GRD
X } MAGNETIC HEADING
Y
SYNCHRO Z COM
X' } VOR BRG
Y'
SYNCHRO Z COM
M2 RMI SERVO AMPL OUT
+27.5 VDC RMI SERVO AMPL
H' RMI SERVO AMPL IN
C' RMI SERVO AMPL IN
P
①
C16 250
C17 250
C18 250
C19 250
C20 250
C6 220
R8 K
R10 250
R9 500
R11 1K
R12 500
P3 51RV-1 TOP PLUG
13 3 7 14 9 8 27 15 16 17 4 5 6 18 20 26 25 24 21 22 30 10 11 12 19 23 28 29
FUTURE SPARE
500 OHM GS DEV LOAD
FUTURE SPARE
250 OHM GS DEV LOAD
GS DEV { +DOWN
+UP
HIGH PWR GS FLAG
26 VAC INPUT
FUTURE SPARES
MAGNETIC HEADING { X WIRE
Y WIRE
Z WIRE
SUGGESTED SPARE
FUTURE SPARE
500 OHM GS FLAG LOAD
1000 OHM GS FLAG LOAD
FUTURE SPARE
+ FLAG GS
- FLAG GS
AC COMMON COLD
VOR BRG { X' WIRE
Y' WIRE
Z' WIRE
M2 RMI SERVO AMPL OUT
+27.5 VDC RMI SERVO AMPL
H' RMI SERVO AMPL IN
C' RMI SERVO AMPL IN

51RV-1 Frame, Schematic Diagram
Figure 819



NOTES:

① ALTHOUGH THE DAMPING CAPACITORS USED IN THE PLENUM ARE NON-POLAR, ADJACENT UNITS MUST BE PLACED IN OPPOSITE DIRECTIONS.

② UNLESS OTHERWISE INDICATED ALL RESISTANCE VALUES ARE IN OHMS AND ALL CAPACITANCE VALUES ARE IN MICROFARADS.

③ WIRE AT JACK TERMINALS BROKEN TO GIVE WIRE COLOR CODE.

COLORED BEAD
GS PWR FLAG AMPL
VOR/LOC PWR FLAG AMPL
S2 DOWN/RIGHT
S1 UP/LEFT
S3 VOR TEST
J5 51V4-B GLIDE SLOPE RCVR
J4 51X-4 VOR/LOC RCVR
344A-2 MANUAL VOR/LOC INSTRUMENTATION UNIT
J2
344F-1 AUTOMATIC VOR INSTRUMENTATION UNIT
J1
P3 51RV-1 BOTTOM PLUG
P3 51RV-1 TOP PLUG
ILS TEST DOWN/RIGHT E201
ILS TEST UP/LEFT E202
LOC TEST SIGNAL E203
NAV DISABLE E199
+27.5 VDC K1-1
GS TEST SIGNAL E198
GS DISABLE E200
GLIDE SLOPE ANTENNA
RG 196/U
VOR/LOC ANTENNA
NAV DISABLE
VOR/LOC OUTPUT
AURAL OUTPUT
VOR/LOC +27.5 VDC PWR IN
DC AND CHASSIS GRD
GS/LOC ENERGIZE
27.5 VDC GS PWR OUT
27.5 VDC GS PWR IN
GS BIAS
-FLAG GS
FLIGHT DIR LOC MODE CONTROL
LOC ENERGIZE
VOR/LOC 27.5 VDC
CR1 IN3255
CR2 IN3255
CR4 IN270
CR6 IN270
CR3 PS6467
CR7 PS6467
CR8 IN647
CR9 IN758A
Q1 2N697
Q2 2N328A
Q3 2N2201
Q4 2N887
Q5 2N697
Q6 2N328A
Q7 2N2201
T1
T2
SENS ADJ
H COURSE RSVR
D COURSE RSVR
+27.5 VDC VOR/LOC PWR INPUT
E COURSE RSVR
G COURSE RSVR
RSVR ROTOR B
RSVR COMMON C
VOR TEST
F COURSE RSVR
AUTO VOR TEST 30 CPS
VOR/LOC DEV (+R)
VOR/LOC DEV (+L)
VOR/LOC FLAG (+)
VOR/LOC FLAG (-)
+ TO
+ FROM
LOC ENERGIZE (+27.5 VDC)
VOR DAMPING
VOR/LOC AUDIO
RSVR ROTOR H, AUTO VOR
VOR +16 VDC REG
LOC ENERGIZE (GROUND)
VOR AUDIO
26 V 400 CPS INPUT
INSTRUMENT DISABLE
MAGNETIC HEADING
SYNCHRO Z COM
VOR BRG
M2 RMI SERVO AMPL OUT
+27.5 VDC RMI SERVO AMPL
H' RMI SERVO AMPL IN
C' RMI SERVO AMPL IN
COURSE RSVR
1000 OHM VOR/LOC FLAG LOAD
1000 OHM VOR/LOC DEV LOAD
500 OHM VOR/LOC FLAG LOAD
TO-FROM LOAD
FLIGHT DIR LOC MODE CONT
NO. FLIGHT DIR LOC MODE CONT
500 OHM VOR/LOC DEV LOAD
HIGH PWR VOR/LOC FLAG
250 OHM VOR/LOC DEV LOAD
RESERVED COURSE DATUM
SUGGESTED SPARE
FUTURE SPARES
FUTURE SPARE
1000 OHM GS DEV LOAD
500 OHM GS DEV LOAD
250 OHM GS DEV LOAD
GS DEV
HIGH PWR GS FLAG
26 VAC INPUT
500 OHM GS FLAG LOAD
1000 OHM GS FLAG LOAD
AC COMMON COLD
M2 RMI SERVO AMPL

51RV-1 Frame, Schematic Diagram
Figure 819

(c) Connect the 479S-3 30~ VAR 0 connector to the oscilloscope horizontal X-input, and set the 479V-3 BEARING DEGREES control to 0 degree.

(d) Connect the vertical Y-input of the oscilloscope through a 10,000-pf capacitor to the test points listed in figure 820, and adjust the 479S-3 PHASE ANGLE SELECTOR to obtain an in-phase relationship on the oscilloscope. If the degrees listed in the 479S-3 PHASE ANGLE SELECTOR column are obtained, the stage is operating properly.

(e) Connect the 479S-3 30~ REF 0 jack to the oscilloscope horizontal X-input.

(f) Connect the Y-input of the oscilloscope through a 10,000-pf capacitor to the test points listed in figure 821, and adjust the 479S-3 PHASE ANGLE SELECTOR to obtain an in-phase relationship on the oscilloscope. This checks the proper operation of the variable 30-cps amplifiers.

(10) 344F-1 VOR Circuits Phase Check.

(a) Perform steps (a) through (c) of paragraph (9) above, and connect the vertical Y-input of the oscilloscope through a 10,000-pf capacitor to the test points listed in figure 822.

(b) Adjust the 479S-3 PHASE ANGLE SELECTOR to obtain an in-phase relationship on the oscilloscope. The circuit is operating normally if the PHASE ANGLE SELECTOR readings agree.

OSCILLOSCOPE VERTICAL INPUT	479S-3 PHASE ANGLE SELECTOR
TP12	188 ±4 degrees
TP13	8 ±4 degrees
TP18	135 ±10 degrees
TP19	315 ±10 degrees
TP20	6 ±10 degrees
TP21	186 ±10 degrees
TP22	186 ±10 degrees
TP24	170 ±10 degrees

344A-2 Reference 30-CPS
Amplifier Phase Check
Figure 820

OSCILLOSCOPE VERTICAL INPUT	479S-3 PHASE ANGLE SELECTOR
TP25	134 ±10 degrees
TP26	314 ±10 degrees
TP27	262 ±10 degrees
TP28	82 ±10 degrees
TP29	82 ±10 degrees
TP31	280 ±10 degrees

344A-2 Variable 30-CPS
Amplifier Phase Check
Figure 821

(c) Connect the 479S-3 30~ REF Ø jack to the oscilloscope horizontal X-input.

(d) Connect the Y-input of the oscilloscope through a 10,000-pf capacitor to the test points listed in figure 823.

(e) Adjust the 479S-3 PHASE ANGLE SELECTOR to obtain an in-phase relationship on the oscilloscope. The circuit is operating normally if the PHASE ANGLE SELECTOR readings agree with those listed in figure 823.

(11) 344A-2 Localizer Section Trouble Shooting.

(a) Perform steps (1) through (14) of paragraph 4.A.

(b) Check input of the localizer circuits with an oscilloscope through a 10,000-pf capacitor to TP1 (figure 805).

(c) Make a-c voltage measurements at TP14, TP15, and TP16 to check gain and operation of amplifier stages Q9, Q10, and Q11.

(12) 51RV-1 Frame Power Flag Unit Checks.

(a) Perform the preliminary steps in paragraph 4.A. (1) through (13).

(b) Check d-c voltages at VOR/LOC power flag transistor elements, and compare with those listed in figure 824 for Q1, Q2, and Q3.

(c) To check the glide slope power flag unit transistors Q5, Q6, and Q7, perform preliminary steps in figure 801.

OSCILLOSCOPE VERTICAL INPUT	479S-3 PHASE ANGLE SELECTOR
TP18	314 ±10 degrees
TP19	134 ±10 degrees
TP20	185 ±10 degrees
TP21	5 ±10 degrees
TP22	5 ±10 degrees
TP24	352 ±10 degrees

344F-1 Reference 30-CPS Amplifier Phase Check
Figure 822

OSCILLOSCOPE VERTICAL INPUT	479S-3 PHASE ANGLE SELECTOR
TP25	138 ±10 degrees
TP26	318 ±10 degrees
TP27	266 ±10 degrees
TP28	86 ±10 degrees
TP29	86 ±10 degrees
TP31	284 ±10 degrees

344F-1 Variable 30-CPS Amplifier Phase Check
Figure 823

TRANSISTOR		D-C VOLTAGE (Typical value)
VOR/LOC UNIT	GLIDE SLOPE UNIT	
Q1 - emitter	Q5 - emitter	0
- base	- base	0.6
- collector	- collector	0.15
Q2 - emitter	Q6 - emitter	27.5
- base	- base	24.0
- collector	- collector	25.0
Q3 - emitter	Q7 - emitter	23.0
- base	- base	25.0
- collector	- collector	27.5

Table of 51RV-1 Frame Power Flag Unit, Transistor Voltages
Figure 824

(13) ILS Self-Test Circuit Check (if installed).

(a) Fabricate the test jig according to the schematic diagram, figure 1002.

NOTE: All localizer and glide slope instrumentation adjustments should be completed before testing the ILS self-test circuitry.

(b) Connect P1 of the test jig to the 51RV-1 connector.

(c) Connect the 313N-3 (J2) to P4 on the test jig.

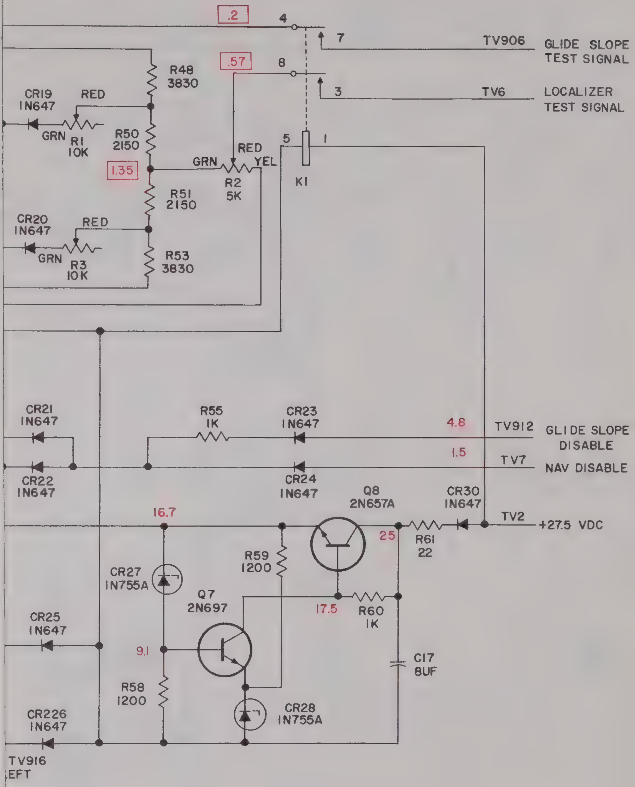
(d) Apply 26-volt, 400-cps and 27.5-volt d-c power to the test jig power connectors.

(e) Set the 313N-3 NAV frequency to 110.10 mc and the power switch to PWR.

(f) Depress either the UP/LEFT or DOWN/RIGHT switch on front of the 51RV-1. Check the a-c and d-c voltages given in figure 825.

(g) Connect the deviation indicator to the VOR/LOC DEVIATION jack and the flag indicator to the VOR/LOC FLAG jack on the test jig. Depress either ILS TEST switch. The deviation indicator reading should be 75 microamperes and the flag indicator reading should be 375 microamperes. If an improper indication is obtained refer to the testing section of this manual (paragraph 6K).

(h) Connect the deviation and flag indicators to the GLIDE SLOPE DEVIATION and and FLAG jacks. Depress either ILS TEST switch. The deviation indicator reading should be 75 microamperes and the flag indicator reading should be 375 microamperes. If an improper indication is obtained refer to the testing section of this manual (paragraph 6K).


.2
4
7
TV906
GLIDE SLOPE TEST SIGNAL
.57
8
3
TV6
LOCALIZER TEST SIGNAL
R48 3830
CR19 IN647
RED
GRN
R1 10K
R50 2150
1.35
5
1
RED
GRN
YEL
R2 5K
K1
R51 2150
CR20 IN647
RED
GRN
R3 10K
R53 3830
CR21 IN647
R55 1K
CR23 IN647
4.8
TV912
GLIDE SLOPE DISABLE
1.5
TV7
NAV DISABLE
CR22 IN647
CR24 IN647
Q8 2N657A
CR30 IN647
16.7
TV2
+27.5 VDC
25
R61 22
R59 1200
CR27 IN755A
Q7 2N697
17.5
R60 1K
CR25 IN647
9.1
C17 8UF
R58 1200
CR28 IN755A
CR226 IN647
TV916
EFT

NOTES:

① UNLESS OTHERWISE INDICATED ALL RESISTANCE VALUES ARE IN OHMS AND ALL CAPACITANCE VALUES ARE IN PICOFARADS.

② ILS SELF TEST MODULE WIRE CONNECTIONS:

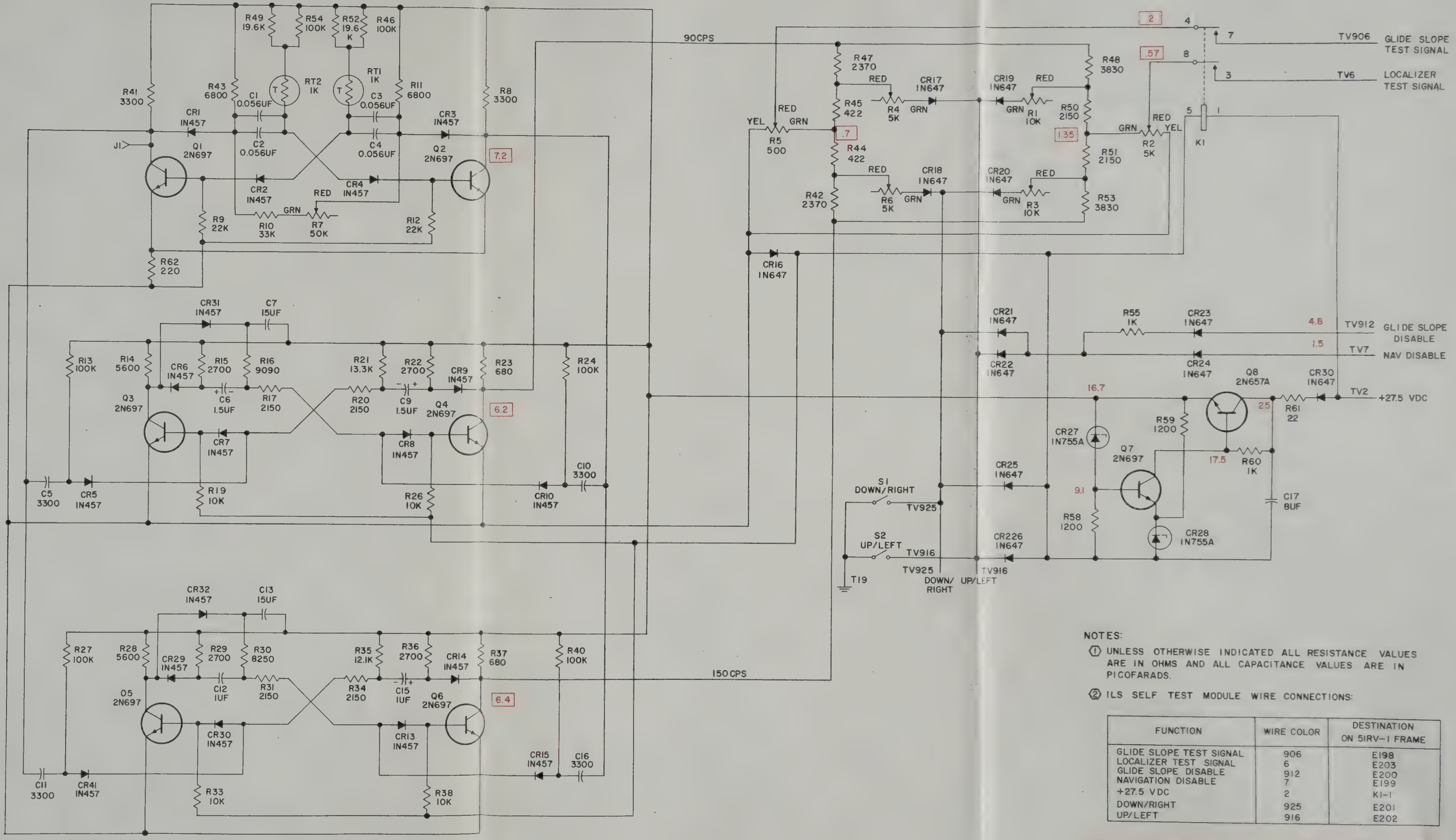
FUNCTION	WIRE COLOR	DESTINATION ON 51RV-1 FRAME
GLIDE SLOPE TEST SIGNAL	906	E198
LOCALIZER TEST SIGNAL	6	E203
GLIDE SLOPE DISABLE	912	E200
NAVIGATION DISABLE	7	E199
+27.5 VDC	2	K1-1
DOWN/RIGHT	925	E201
UP/LEFT	916	E202

③ BOXED NUMBERS ARE AC RMS VOLTAGES AND UNBOXED NUMBERS ARE DC VOLTAGES. ALL VOLTAGES ARE MEASURED WITH EITHER ILS-TEST SWITCH ACTUATED. ALL VOLTAGES HAVE ± 20% TOLERANCE.

eceiver ILS Self-Test Module, Schematic Diagram
Figure 825

(g) Connect the deviation indicator to the VOR/LOC DEVIATION jack and the flag indicator to the VOR/LOC FLAG jack on the test jig. Depress either ILS TEST switch. The deviation indicator reading should be 75 microamperes and the flag indicator reading should be 375 microamperes. If an improper indication is obtained refer to the testing section of this manual (paragraph 6K).

(h) Connect the deviation and flag indicators to the GLIDE SLOPE DEVIATION and and FLAG jacks. Depress either ILS TEST switch. The deviation indicator reading should be 75 microamperes and the flag indicator reading should be 375 microamperes. If an improper indication is obtained refer to the testing section of this manual (paragraph 6K).


R49 19.6K
R54 100K
R52 19.6 K
R46 100K
R41 3300
R43 6800
C1 0.056UF
RT2 1K
RT1 1K
C3 0.056UF
R11 6800
R8 3300
CR1 1N457
CR3 1N457
J1
Q1 2N697
C2 0.056UF
C4 0.056UF
Q2 2N697
7.2
CR2 1N457
RED
CR4 1N457
GRN
R9 22K
R10 33K
R7 50K
R12 22K
R62 220
90CPS
CR31 1N457
C7 15UF
R13 100K
R14 5600
CR6 1N457
R15 2700
R16 9090
R21 13.3K
R22 2700
CR9 1N457
R23 680
R24 100K
Q3 2N697
C6 1.5UF
R17 2150
R20 2150
C9 1.5UF
Q4 2N697
6.2
CR7 1N457
CR8 1N457
C10 3300
C5 3300
CR5 1N457
R19 10K
R26 10K
CR10 1N457
CR32 1N457
C13 15UF
R27 100K
R28 5600
CR29 1N457
R29 2700
R30 8250
R35 12.1K
R36 2700
CR14 1N457
R37 680
R40 100K
150CPS
Q5 2N697
C12 1UF
R31 2150
R34 2150
C15 1UF
Q6 2N697
6.4
CR30 1N457
CR13 1N457
CR15 1N457
C16 3300
C11 3300
CR41 1N457
R33 10K
R38 10K
2
4
7
TV906
GLIDE SLOPE TEST SIGNAL
.57
8
3
TV6
LOCALIZER TEST SIGNAL
R47 2370
R48 3830
RED
CR17 1N647
CR19 1N647
RED
R45 422
R4 5K
GRN
R1 10K
R50 2150
5
1
YEL
RED
GRN
R5 500
.7
1.35
GRN
RED
YEL
R2 5K
K1
R44 422
R51 2150
RED
CR18 1N647
CR20 1N647
RED
R42 2370
R6 5K
GRN
R3 10K
R53 3830
CR16 1N647
CR21 1N647
R55 1K
CR23 1N647
4.6
TV912
GLIDE SLOPE DISABLE
1.5
TV7
NAV DISABLE
CR22 1N647
CR24 1N647
Q8 2N657A
CR30 1N647
16.7
TV2
+27.5 VDC
2.5
R61 22
CR27 1N755A
R59 1200
17.5
R60 1K
Q7 2N697
CR25 1N647
9.1
C17 8UF
S1 DOWN/RIGHT
TV925
R58 1200
S2 UP/LEFT
TV916
CR226 1N647
CR28 1N755A
T19
TV925
DOWN/ RIGHT
TV916
UP/LEFT

NOTES:

① UNLESS OTHERWISE INDICATED ALL RESISTANCE VALUES ARE IN OHMS AND ALL CAPACITANCE VALUES ARE IN PICOFARADS.

② ILS SELF TEST MODULE WIRE CONNECTIONS:

FUNCTION	WIRE COLOR	DESTINATION ON 51RV-1 FRAME
GLIDE SLOPE TEST SIGNAL	906	E198
LOCALIZER TEST SIGNAL	6	E203
GLIDE SLOPE DISABLE	912	E200
NAVIGATION DISABLE	7	E199
+27.5 VDC	2	K1-1
DOWN/RIGHT	925	E201
UP/LEFT	916	E202

③ BOXED NUMBERS ARE AC RMS VOLTAGES AND UNBOXED NUMBERS ARE DC VOLTAGES. ALL VOLTAGES ARE MEASURED WITH EITHER ILS-TEST SWITCH ACTUATED. ALL VOLTAGES HAVE ± 20% TOLERANCE.

51RV-1 VOR/ILS Receiver ILS Self-Test Module, Schematic Diagram
Figure 825

51RV-1 VOR/ILS Receiver - Storage Instructions

1. GENERAL.

The 51RV-1 VOR/ILS Receiver should be stored in the original shipping carton if it is available. Wrap the receiver in a plastic bag with two or more 16-unit bags of desiccant, and heat-seal the opening. If heat-sealing equipment is not available, wrap the plastic bag opening with several turns of small wire, and place in the carton.

51RV-1 VOR/ILS Receiver - Special Tools, Fixtures, and Test Equipment

1. GENERAL.

This section describes the test equipment and special fixtures required to overhaul the 51RV-1 VOR/ILS Receiver.

2. TEST EQUIPMENT REQUIRED.

The test equipment, or its equivalent, that is required to test, align, and trouble shoot the 51RV-1 is listed in figure 1001.

EQUIPMENT	MANUFACTURER AND TYPE
Test jig	To be locally fabricated (see figure 1002)
Vtvm (a-c)	Hewlett-Packard 400D, 400H, or Ballantine 300
Vtvm (r-f)	Boonton 91C
VOM	Triplett 630
Glide slope test set (signal generator)	Boonton 232-A
Signal generator	Boonton 211-A
Signal generator	Hewlett-Packard 606
6-db pad and cable (included with 211-A and 232-A)	Boonton 505-A and 514-B
Deviation indicator	Weston 901 (1000-ohm, 1-percent accuracy, 150-0-150 microamperes)
Flag indicator	Weston 901 (modified to 1000 ohms, 1-percent accuracy, 0-500 microamperes)
Control	Collins 313N-3

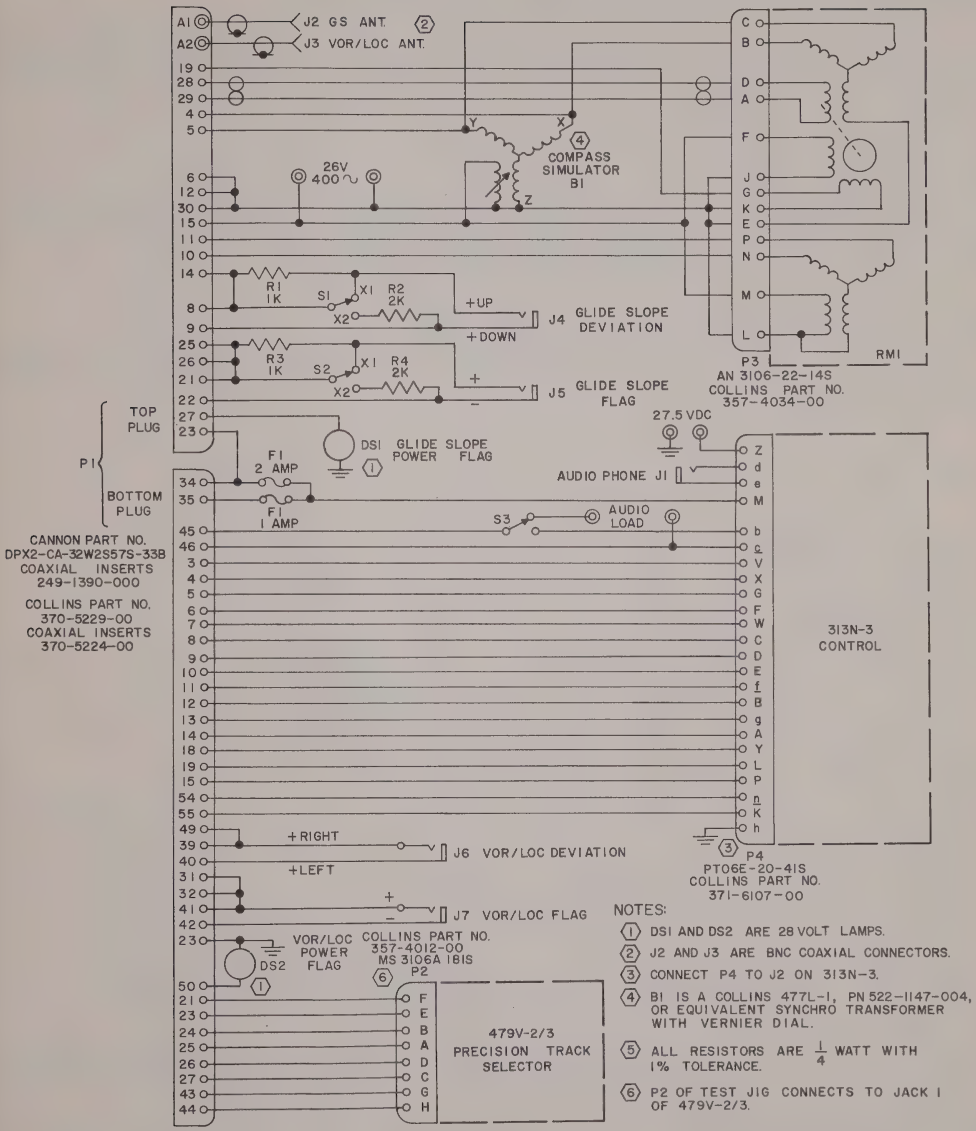
Test Equipment and Special Fixtures Required (Sheet 1 of 2)
Figure 1001

EQUIPMENT	MANUFACTURER AND TYPE
Receiver	Collins 51J-4
Oscilloscope	Dumont 304-A
Audio oscillator	Hewlett-Packard 200AB
Audio output meter	General 583A
Distortion meter	Hewlett-Packard 330D
Signal generator	Collins 479S-3
Precision track selector	Collins 479V-2/3
Frequency counter	Hewlett-Packard 524D with 525A plug-in head
Differential voltmeter	Fluke Model 801
Resistance decade	
Headphones	
Stop watch	
Power supplies	0-32 volts d-c at 1.5 amperes
	26 volts, 400 cps
Bearing mechanism module test jig	To be locally fabricated, see figure 1003.
344F-1 tracking test jig	To be locally fabricated, see figure 1004.

Test Equipment and Special Fixtures Required (Sheet 2 of 2)
Figure 1001

3. 51RV-1 TEST JIG. (Refer to figure 1002.)

All electrical components required to construct the test jig are shown on the schematic diagram. Connectors P1, P2, P3, and P4 may be mounted on the test jig frame in a location to provide for direct mounting of the 51RV-1, 479V-3, RMI, and 313N-3. If it is desired to separate the equipment from the test jig, all the wires attached to the connectors should be lengthened to form pendant cables. Place sleeving over each set of wires, and run each set through a rubber grommet in the test jig frame.


A1
A2
J2 GS ANT.
J3 VOR/LOC ANT.
②
19
28
29
4
5
Y
X
④ COMPASS SIMULATOR B1
Z
26V 400 ~
6
12
30
15
11
10
14
R1 1K
S1
X1
R2 2K
X2
8
9
+UP
+DOWN
J4 GLIDE SLOPE DEVIATION
25
26
21
22
R3 1K
S2
X1
R4 2K
X2
+
−
J5 GLIDE SLOPE FLAG
27
23
DS1 GLIDE SLOPE POWER FLAG
①
TOP PLUG
P1
BOTTOM PLUG
CANNON PART NO. DPX2-CA-32W2S57S-33B
COAXIAL INSERTS 249-1390-000
COLLINS PART NO. 370-5229-00
COAXIAL INSERTS 370-5224-00
F1 2 AMP
F1 1 AMP
34
35
45
46
3
4
5
6
7
8
9
10
11
12
13
14
18
19
15
54
55
49
39
40
31
32
41
42
23
50
21
23
24
25
26
27
43
44
+RIGHT
+LEFT
J6 VOR/LOC DEVIATION
+
−
J7 VOR/LOC FLAG
VOR/LOC POWER FLAG
DS2
①
COLLINS PART NO. 357-4012-00
MS 3106A 18IS
P2
⑥
F
E
B
A
D
C
G
H
479V-2/3 PRECISION TRACK SELECTOR
C
B
D
A
F
J
G
K
E
P
N
M
L
RMI
P3
AN 3106-22-14S
COLLINS PART NO. 357-4034-00
27.5 VDC
AUDIO PHONE J1
S3
AUDIO LOAD
Z
d
e
M
b
c
V
X
G
F
W
C
D
E
f
B
g
A
Y
L
P
n
K
h
313N-3 CONTROL
③
P4
PT06E-20-41S
COLLINS PART NO. 371-6107-00

NOTES:

① DS1 AND DS2 ARE 28 VOLT LAMPS.

② J2 AND J3 ARE BNC COAXIAL CONNECTORS.

③ CONNECT P4 TO J2 ON 313N-3.

④ B1 IS A COLLINS 477L-1, PN 522-1147-004, OR EQUIVALENT SYNCHRO TRANSFORMER WITH VERNIER DIAL.

⑤ ALL RESISTORS ARE $\frac{1}{4}$ WATT WITH 1% TOLERANCE.

⑥ P2 OF TEST JIG CONNECTS TO JACK 1 OF 479V-2/3.

51RV-1 Test Jig, Schematic Diagram
Figure 1002

4. BEARING MECHANISM MODULE TEST JIG. (Refer to figure 1003.)

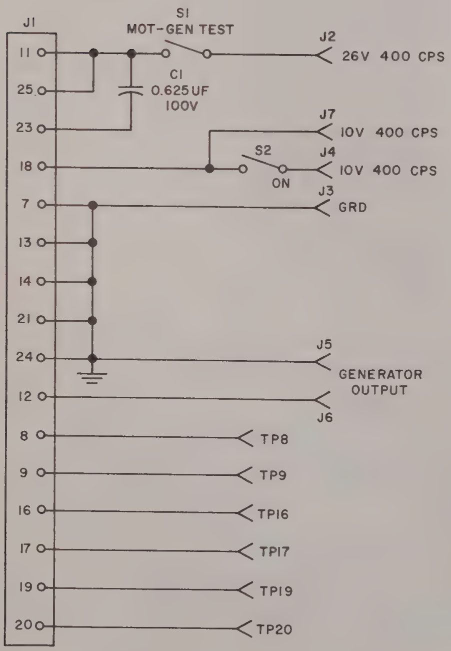
The bearing mechanism module test jig is used to apply the proper voltages to the bearing mechanism module when it is removed from the 344F-1. The test jig also provides external test points to make it possible to EZ (electrical zero) the resolver B2 and synchro differential B3.

5. 344F-1 TRACKING TEST JIG. (Refer to figure 1004.)

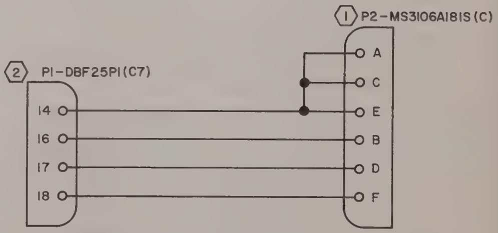
The 344F-1 tracking test jig is used to connect the output of the 344F-1 bearing servo amplifier to the 479V-2/3. This makes possible to use the principle of manual VOR operation to check the automatic VOR amplifiers and phase detector.

6. OSCILLATOR TUNING PROBE. (Refer to figure 1005.)

The oscillator tuning probe is designed to detect r-f signals. The probe is used to align the 51V-4B first oscillator.


J1
S1
MOT-GEN TEST
J2
26V 400 CPS
C1
0.625UF
100V
J7
10V 400 CPS
S2
J4
10V 400 CPS
ON
J3
GRD
J5
GENERATOR OUTPUT
J6
11
25
23
18
7
13
14
21
24
12
8
9
16
17
19
20
TP8
TP9
TP16
TP17
TP19
TP20

Bearing Mechanism Module Test Jig
Figure 1003


① P2-MS3106A181S(C)
② P1-DBF25P1(C7)
14
16
17
18
A
C
E
B
D
F

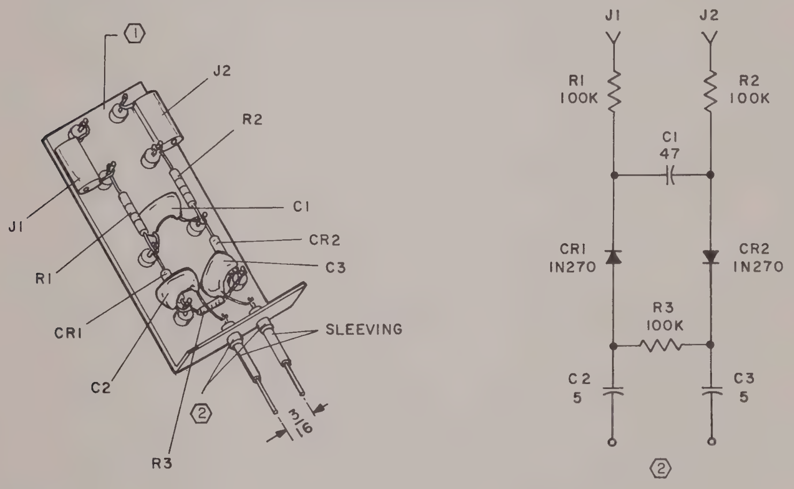
NOTE

① WIRES FROM P1 MAY BE CONNECTED DIRECTLY TO TB1 ON THE 479V-3 REAR PANEL, INSTEAD OF P2 ON TEST JIG.

② MATES WITH 344F-1 J8.

344F-1 Tracking Test Jig
Figure 1004

SYMBOL	DESCRIPTION	COLLINS PART NO.
C1	CAPACITOR, 47PF ±5%	912-2792-00
C2, C3	CAPACITOR, 5PF ±5%	912-2750-00
R1, R2, R3	RESISTOR, 100K ±10% 1/4 WATT	745-0821-00
CR1, CR2	CRYSTAL DIODE 1N270	353-2018-00
J1, J2	JACK, TIP	360-0160-00
TERMINAL (8)	STANDOFF	306-1260-00
TERMINAL (2)	FEED THROUGH	306-1270-00


①
J2
R2
C1
CR2
C3
SLEEVING
J1
R1
CR1
C2
②
$\frac{3}{16}$
R3
J1
J2
R1
100K
R2
100K
C1
47
CR1
1N270
CR2
1N270
R3
100K
C2
5
C3
5
②

NOTES.

① COMPONENTS ARE PLACED ON A $2\frac{3}{4}$ X 1 INCH ALUMINUM SHEET WITH $\frac{1}{2}$ INCH AT ONE END BENT 90°.

② SOLDER TWO $\frac{1}{16}$ INCH BRASS TUBES TO THE FEED THROUGH TERMINALS.

51V-4B Oscillator Tuning Probe
Figure 1005

523-0756471-201115
1 August 1963
2nd Revision, 15 December 1964

COLLINS

illustrated parts catalog

51RV-1 VOR/ILS
Receiver

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Printed in U.S.A

COLLINS

ILLUSTRATED PARTS CATALOG

Record of Revisions

51RV-1 VOR/ILS Receiver	LOCATION
ASSIGNED TO (JOB TITLE)	

REV. NO.	REVISION DATE	INSERTION DATE	BY	REV. NO.	REVISION DATE	INSERTION DATE	BY
1	April 1/64						
2	Dec 15/64						

RETAIN THIS RECORD IN THE FRONT OF MANUAL OR CHAPTER.

ON RECEIPT OF REVISIONS, INSERT REVISED PAGES IN THE MANUAL, AND ENTER DATE INSERTED AND INITIALS.

Section I

Introduction

1. GENERAL.

This Illustrated Parts Catalog is a complete list of parts for the following equipment manufactured by Collins Radio Company (see figure 1).

51RV-1 VOR/ILS Receiver

For servicing and overhaul, refer to the appropriate manual.

Periodically the Illustrated Parts Catalog is revised to cover additions, deletions, or changes to the equipment. These revisions are indicated by an R placed to the left of each revised line and apply to the current revision only.

2. TABLE OF CONTENTS.

Section II, Table of Contents, contains a list of all sections, locating each section by its page number. The Group Assembly Parts List section is broken down into a list of illustrations giving corresponding figure and page numbers.

3. PARTS LIST INDEXES.

Section III, Parts List Indexes, consists of a Numerical Parts List Index, a Symbol List Index, and a Commercial Hardware List Index.

A. Numerical Parts List Index.

This index contains an alphanumerical list of all parts listed in the Group Assembly Parts List.

(1) PART NUMBER Column.

In this column are listed part numbers for procurable parts and assemblies in the Group Assembly Parts List.

(a) Order of Precedence.

The order of precedence beginning at the extreme left-hand position in part number numerical arrangement is as follows:
Letters A through Z
Numerals 0 through 9 (Alphabetical O's are considered as numerical zeros.)

The order of precedence in continuing the part number arrangement in second and succeeding positions of the part number from left to right is as follows:
Space (blank column)
Diagonal (slant)/

Point (period).
Dash (-)
Letters A through Z
Numerals 0 through 9 (Alphabetical O's are considered as numerical zeros.)

(b) Collins Radio Company Part Numbering System.

The drawing number and part number are identical. A typical number consists of nine or ten digits, divided by dashes into three segments (example: 540-0189-004).

1. The first three digits are the family number. Any family number beginning with 500 through 599 or 755 through 795 (540-XXXX-XXX) is a part peculiar, assembly, or subassembly designed and manufactured by Collins Radio Company. Numbers that do not begin with 500 through 599 or 755 through 795 are purchased parts.

2. The center four digits (XXX-0189-XXX) are assigned in numerical sequence as needed beginning with 0001 and continuing through 9999.

3. The final two or three digits (XXX-XXXX-004) are used to provide separate inventory and stock control over variations of piece parts and assemblies.

(2) FIG.-ITEM Column.

This column lists the Group Assembly Parts List figure and item numbers assigned to the associated part numbers. The figure and item number shown in the Numerical Parts List Index is for the first occurrence of the part only.

(3) QTY Column.

Total quantity of parts or assemblies used in the equipment is listed in this column.

B. Symbol List Index.

The symbol list index enables the user to locate, by symbol, the part number and the figure and item number of any electrical item that appears on the schematic diagram.

(1) SYMBOL Column.

This column contains an alphanumerical listing of all symboled items. When the same symbol appears in different units or subassemblies, module symbol prefix designators are used. Where no prefix has been assigned, separate indexes will be given. Prefix designators, if required, will be found in paragraph 6.

(2) PART NUMBER Column.

It gives the Collins part number for all symboled items.

(3) FIG.-ITEM Column.

This column contains the Group Assembly Parts List figure and item numbers assigned to the reference-designated items. The figure and item numbers are used to locate a part in the Group Assembly Parts List after it has been located in the Symbol List Index.

C. Commercial Hardware List Index.

This index contains a list of all commercially available hardware items used with the equipment and is the total of all commercial hardware items that appear in the Numerical Parts List.

(1) PART NUMBER Column.

Contains Collins part number for all commerical hardware.

(2) NOMENCLATURE Column.

Contains a description of all commercially available hardware including the type of material, dimensions, and type of finish.

(3) QTY Column.

Gives the total quantity of each commerical hardware item used in the entire equipment.

4. GROUP ASSEMBLY PARTS LIST.

A. General.

Section IV, Group Assembly Parts List, consists of a breakdown of the complete unit into subassemblies and detailed parts. Each assembly is listed in its order of disassembly and is followed immediately by its component parts properly indented to show their relationship to the assembly.

(1) FIG.-ITEM Column.

Figure and item numbers key the parts breakdown to the applicable illustration. Items in the parts breakdown preceeded by a dash (example -1) do not appear on the illustration.

(2) PART NO. Column.

Part numbers listed are MIL part numbers, vendor part numbers, or Collins part numbers. When more than one part number is available, the preference will be MIL, vendor, and Collins in that order. Vendor part numbers listed in the part number column are subject to change without notice.

(3) Proprietary Items.

Proprietary items are coded P in the part number column.

(4) NOMENCLATURE Column.

In this column are listed each assembly, subassembly, sub-subassembly, a reference to its next higher assembly (NHA), and their attaching parts; attaching parts are listed immediately following the parts which they attach. Items which are made from raw stock, such as cut lengths of wire, solder, varnish, lacing cord, and flexible tubing are not included in the Group Assembly Parts List.

If a part is purchased by Collins Radio Company from a vendor, the Federal Manufacturer's Code number, preceded by the letter V, is listed in this column. The vendors part number will be listed in the part number column, and the Collins part number will appear in the nomenclature column. If this column does not include a Federal Manufacturer's Code number, the part number listed is a Collins part number. The vendors name and address are indicated in paragraph 5. Symbol designations, where applicable, will be listed following the Collins part number. Serial number or MCN (manufacturing control number) effectivities, where applicable, are listed following the last item in this column. Serial number effectivities are designated on nameplates. The MCN is stamped on each module and/or chassis. For example, the first module and/or chassis would be stamped MCN 101, the second MCN 102, etc. This Illustrated Parts Catalog reflects changes made by field service bulletins. Notices of such changes are added at the end of the description in the nomenclature column.

(5) USAGE CODE Column.

Part variations within different models of the same equipment are indicated in the usage code column. In cases where this column has been left blank, the part listed will apply to all models of equipment covered by this publication. If usage codes are required, see paragraph 6.

(6) UNITS PER ASSY. Column.

This column lists the quantity of subassemblies or parts required in the next higher assembly. The quantities specified, therefore, are not necessarily the total used per equipment. The letters AR denote that the selection of a part or parts should be made as required. REF refers to an assembly which is completely assembled on a preceding illustration.

5. VENDORS CODE AND NAME INDEX.

CODE	VENDORS NAME AND ADDRESS	CODE	VENDORS NAME AND ADDRESS
00213	Sage Electronics Corp. Country Club Rd. E. Rochester, N.Y.	01121	Allen-Bradley Co. 136 W. Greenfield Ave. Milwaukee 4, Wis.
00222	ES C Corp. 534 Bergen Blvd. Palisades Park, N.J.	01281	Pacific Semiconductors, Inc. 10451 W. Jeffereson Blvd. Culver City, Calif.

VENDOR'S CODE-NAME INDEX

CODE	VENDOR'S NAME AND ADDRESS
01526	Specialty Control Dept. GECO Waynesboro, Va.
01881	Anaconda American Brass Co. Waterbury, Conn.
01939	Sprague Electric Co. of Wisconsin 1146 6th Ave. Grafton, Wis.
03508	Semi-Conductor Products Dept. GECO Electronics Park Syracuse, N.Y.
03877	Transitron Electronic Corp. 168 Abion St. Wakefield, Mass.
03998	Cedar Engineering Division of Control Data Corp. 5806 W. 36th St. Minneapolis 16, Minn.
04713	Motorola Inc. Semiconductor Products Division 5005 E. McDowell Rd. Phoenix, Ariz.
05397	Kemet Co. Division of Carbide Corp. 11901 Madison Ave. Cleveland 1, Ohio
06001	Capacitor Dept. GECO P.O. Box 58 Ormo, S.C.
06751	Nuclear Corp. of America, Inc. U.S. Semcor Division 3540 W. Osborn Rd. Phoenix, Airz.
06961	Clevite Electronic Components Division of Clevite Corp. Cleveland, Ohio
07707	United Shoe Machinery Corp. Fastener Division Shelton, Conn.
07896	Jadaro Machine Products P.O. Box 155 Garland, Tex.
07933	Rheem Semiconductor Corp. 350 Ellis St. Mountain View, Calif.
08289	Blinn, Delbert, Co. P.O. Box 757 Pomona, Calif.
08732	Solid State Products, Inc. 1 Pingree St. Salem, Mass.
09922	Burndy Corp. Omaton Division Norwalk, Conn.
10583	Industrial Mica Corp. 223 S. Van Brunt St. Englewood, N.J.
10646	Carborundum Co., Globar Plant Electronics Division Niagara Falls, N.Y.
12014	Chicago Rivet and Machine Co. 950 S. 25th Ave. Bellewood, Ill.
12615	U.S. Terminals, Inc. 7508 Camargo Rd. Cincinnati 43, Ohio
14655	Cornell-Dubilier Electric Corp. 50 Paris St. Newark, N.J.
15909	Daven Co. 530 W. Mt. Pleasant Ave. Livingston, N.J.
19701	Electra Mfg. Co. Independence, Kans.
21520	Fansteel Metallurgical Corp. 2200 N. Sheridan Rd. North Chicago, Ill.

VENDOR'S CODE-NAME INDEX

CODE	VENDOR'S NAME AND ADDRESS
40920	Miniature Precision Bearings, Inc. Precision Park Keene, N.H.
46384	Penn Engineering and Mfg., Corp. Box 311 Doylestown, Pa.
49671	Radio Corp. of America 36 W. 49th St. New York, N.Y.
53021	Sangamo Electric Co. 1207 N. 11th St. Springfield, Ill.
56289	Sprague Electric Co. 481 Marshall St. North Adams, Mass.
57771	Stimpson, Edwin B., Co., Inc. 74 Franklin Ave. Brooklyn 5, N.Y.
59446	Telex, Inc. Telex Park 1633 Eustis St. St. Paul, Minn.
70674	ADC Products, Division of Magnetics Controls Co. 6411 Cambridge St. Minneapolis 26, Minn.
71450	CTS Corp. 1142 W. Beardsley Ave. Elkhart, Ind.
71468	Cannon Electric Co. 3208 Humbolt St. Los Angeles 31, Calif.
71590	Centralab Division of Globe-Union, Inc. 900A E. Keefe Ave. Milwaukee 1, Wis.
71785	Cinch Mfg. Co. Division of United-Carr Fastener Corp. 1026 S. Homan Ave. Chicago, Ill.
72568	G-M Laboratories, Inc. 4300 Knox Ave. Chicago, Ill.
72136	Electro Motive Mfg. Co. S. Park and John Sts. Willimantic, Conn.
72962	Elastic Stop Nut Corp. of America 2330 Vauxhall Rd. Union, N.J.
72982	Erie Resistor Corp. 644W. 12th St. Erie, Pa.
73899	J.F.D. Electronics Corp. 6101 16th Ave. Brooklyn, N.Y.
73445	Amperex Electronic Co. Division of North American Philips Co., Inc. 230 Duffy Ave. Hicksville, N.Y.
75042	International Resistance Co. 401 N. Broad St. Philadelphia, Pa.
75237	Kaynar Mfg. Co. Pico-Rivera, Calif.
75543	Lavelle Rubber Co. 424 N. Wood St. Chicago, Ill.
76487	Millen, James, Mfg. Co., Inc. 150 Exchange St. Malden 48, Mass.
77147	Patton MacGuyer Co. 17 Virginia Ave. Providence, R.I.
77250	Pheoll Mfg. Co., Inc. 5700 Roosevelt Rd. Chicago, Ill.

VENDOR'S CODE-NAME INDEX

CODE	VENDOR'S NAME AND ADDRESS
77259	Nytronic, Inc. Essex Electronics Division 550 Springfield Ave. Berkeley Heights, N.J.
77523	Redford Ornametal Iron Works Detroit, Mich.
78189	Shakeproof Division of Illinois Tool Works, Inc. St. Charles Rd. Elgin, Ill.
78488	Stackpole Carbon Co. Stackpole St. St. Marys, Pa.
79136	Waldes Kohinoor, Inc. 47-16 Austel Pl. Long Island City 1, N.Y.
79807	Wrought Washer Mfg. Co. 2252 S. Bay St. Milwaukee 7, Wis.
80223	United Transformer Corp. 150 Varick St. New York 13, N.Y.
80294	Bourns Laboratories, Inc. 6135 Magnoilia Ave. Box 1112 Riverside, Calif.
81073	Grayhill, Inc. 569 Hillgrave Ave. LaGrange, Ill.
81815	Communications Coil Co. 2839 N. Narragansett Chicago 34, Ill.
82142	Jeffers Electronics Division of Speer Carbon Co. Hoover Ave. DuBois, Pa.
83058	Carr Fastener Co. Cambridge, Mass.
85301	Badgett Steam Lubricator Co. 1701 Park Ave. Chickasha, Okla.
85675	Midland Mfg. Co., Inc. 3155 Fiberglass Rd. Kansas City 15, Kans.
86197	Clifton Precision Products Co. Maple at Broadway Clifton Heights, Pa.
86577	Precision Metal Products of Malden, Inc. 41 Elm St. Stoneham 80, Mass.
87216	Philco Corp. Lansdale Division Lansdale, Pa.
87739	U.S. Gasket and Shim Co. Cuyahoga Falls, Ohio
88063	Communications Accessories Co. 50 Hgwy at 71 By-Pass Lees Summit, Mo.
88818	Kearfott Division of General Precision, Inc. Little Falls, N.J.
89462	Waldes Kohinoor, Inc. Cambridge, Mass.
91146	Cannon Electric Co. Salem Division Pingree and Leavitt Sts. Salem, Mass.
91637	Dale Electronics, Inc. 1370 28th Ave. Columbus, Nebr.
91662	Elco Corp. Willow Grove, Pa.

VENDOR'S CODE-NAME INDEX

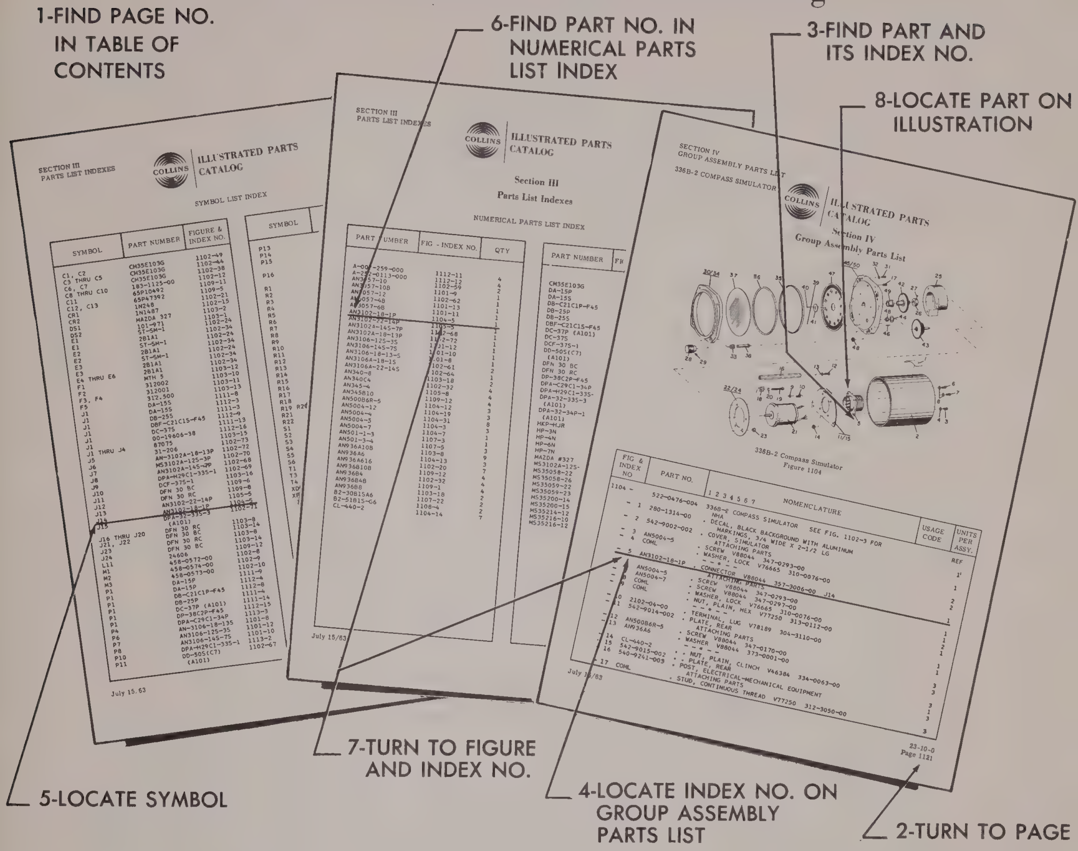
CODE	VENDOR'S NAME AND ADDRESS
96095	Hi-Q Division of Aerovox Corp. Seneca St. Box 493 Olean, N.Y.
96214	Texas Instruments, Inc. Apparatus Division Box 6015 Dallas 22, Texas
96341	Microwave Associates, Inc. Northwest Industrial Pk. Burlington, Mass.
96733	San Fernando Electric Mfg. Co. Box 351 San Fernando, Calif.
97315	Ballastran Corp. 1701 N. Calhoun St. Ft. Wayne, Ind.
98291	Sealectro Corp. 139 Hoyt St. Mamaroneck, N.Y.
98978	International Electronic Research Corp. P.O. Box 271 Burbank, Calif.
99378	Atlee Corp. 2 Lowell Ave. Winchester, Mass.
99800	Delevan Electronics Corp. 270 Quaker Rd, Dept EE3 East Aurora, N.Y.

6. TABLE I.

a. USABLE ON CODES. The following codes have been assigned in this manual:

USE ON CODE	UNIT	FIGURE
A	51RV-1 522-2450-00	1
B	51RV-1 522-2450-011	1
C	51RV-1 522-2450-012	1
D	51RV-1 522-2450-013	1
E	Electronic Control Amplifier 553-6518-004	3
F	Electronic Control Amplifier 553-6517-004	3
G	51RV-1 522-2450-014	1
H	51RV-1 522-2450-015	1
J	51RV-1 522-2450-016	1
K	51RV-1 522-2450-018	1

How to Use This Illustrated Parts Catalog


1-FIND PAGE NO. IN TABLE OF CONTENTS
6-FIND PART NO. IN NUMERICAL PARTS LIST INDEX
3-FIND PART AND ITS INDEX NO.
8-LOCATE PART ON ILLUSTRATION
7-TURN TO FIGURE AND INDEX NO.
5-LOCATE SYMBOL
4-LOCATE INDEX NO. ON GROUP ASSEMBLY PARTS LIST
2-TURN TO PAGE

HOW TO FIND THE PART NUMBER IF THE SECTION OR SYSTEM OF THE EQUIPMENT IN WHICH THE PART IS USED IS KNOWN:

(1) Turn to the Table of Contents and find the page number for the Major Assembly or System in which the part is used.

(2) Turn to the page determined in step (1).

(3) Locate the part and its index number on the illustration.

(4) Find the index number on the Group Assembly Parts List page to determine complete description.

(5) If the reference designation symbol is known, refer to the Symbol List Index to find the part number.

HOW TO FIND THE ILLUSTRATION FOR A PART IF THE PART NUMBER IS KNOWN:

(6) Refer to the Numerical Parts List Index and find the part number.

(7) Turn to section IV and find the first figure and index number indicated in the Numerical Parts List Index for that part. If this figure shows the part in a section or system of the equipment other than the one desired, refer to the other figure numbers listed in the Numerical Parts List Index.

(8) On the face of the illustration, find the index number determined in step (7).

Section II

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	COMMERCIAL HARDWARE LIST INDEX	33
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LIST OF ILLUSTRATIONS

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Bearing Servomechanism	8	70
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Glide Slope Oscillator Subassembly	11	85
Branched Wiring Harness	12	89
51X-4 VOR Radio Receiver	13	91
Amplifier-Filter-Mixer Assembly	14	102
Voltage Regulator	15	105
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Oscillator Subassembly	17	111
Tuning Matrix Subassembly	18	115
Oscillator Subassembly	19	118
Instrumentation Landing System Test Subassembly	20	120

Section III

Parts List Indexes

NUMERICAL PARTS LIST INDEX

PART NUMBER	FIG.-ITEM	QTY
AB396-1	3-6	30
AB397-1	6-144	1
AB3973	4-162	4
AB404D	13-8	13
AB405D	13-209	1
AB406D	13-8	3
AN345B10	4-224	15
AN500C4-3	13-155	2
A12565	4-133	2
A14050	13-16	1
A1444HOTTINNED	10-70	6
A1956HOTTINNED	10-64	3
A25HOTTINNED	20-126	1
A51043	20-120	7
BC3179	13-196	1
BJ24231	6-10	1
BJ24232	5-52	1
BJ24238	4-9	3
BJ24240	4-48	2
BJ24243	4-10	2
BJ24246	4-11	4
BJ24248	4-42	4
BM24956	5-46	2
BS48151BLK NIPLOROX	2-72	2
CF1-8 200-1PCT	2-50	1
CF1-8 250-1PCT	2-55	2
CF1-8 500-1PCT	2-49	4
CK60AW102M	14-8	13
CK60AX471M	11-29	6
CK62AW472M	4-17	5
CL25BG400UP3	13-59	1
CL25BN080UP3	20-40	1
CL25BN250UP3	9-55A	1
CL35BQ0R5MP3	9-54A	1
CL65CG181MP3	13-90	1
CM05E200J03	16-19	2
CM05E360J03	10-22	1
CM05E470J03	17-31	4
CM05E680J03	9-80	1
CM05F101J03	16-17	2
CM05F131J03	13-35	1
CM05F221J03	10-1	5
CM05F271J03	13-109	1
CM05F331J03	13-22	4
CM06F332J03	20-16	4
CN401F80BWHT	9-133	6
C9136	5-17	1
DA855-013	10-31	4
DBM21W1P	13-166	1
DBM21W1S	2-35	1
DB19678-11	2-33	2
DB25PC7	6-150	2
DB25SC7	2-34	2
DM10C050J	17-32	1
DM15C050J01	10-41	2
DM15C100J01	13-29	5
DM15C150J01	10-2	2
DM15F471J03	10-39	4
DM15F510J03	13-53	1
DM20F152G500WV	4-79	3
DM20F222J500WV	19-7	1
DM42F563J03	20-85	4
DM53740-5000	14-43A	1
DM53742-5000	2-32	1
DPA24W2-33S1	2-29	1
DPA24W2-34P1	12-3	1
DPA32-33SA101	2-30	1
DPA32-34PA101	4-56	1
DPA50048-1	2-31	1
DPA53572-1	12-2	1
DPX2CA32W2P 57P34B0202	2-36	1
D0T38	6-28	3
D0T39	7-22	1
D10404	6-146	1
D10405	4-220	1
FHS440-5	5-74	3
FTSM1	7-36	2
FTSM14	4-232	14
F12NCFMA1-62	4-231	4
F12NCFMA2-62	2-86	2
F22NCFMA1-26	3-21	7
F22NCFMA1-40	2-90	7
F22NM107-62	2-2	2
GA-27UUFPORM5PCT	10-32	3
GA-33UUFPORM5PCT	11-35	1
GA10-0UUF PORM5PCT	9-66	3
GA2-0UUFPORM5PCT	14-4A	1
GA6-2UUFPORM5PCT	9-49	2
G116-148	18-38	9
G2621	2-81	100
G3821	4-233	7
G4777-10	4-222	39
IMC140	4-224	30
J301-1000	13-54	1
J301-500	13-142	4
KR022J35S	13-116	2
KR047J35S	4-123	9
KR22J35S	4-157	1
KR47J35KS	9-59	3
KR47J35S	4-172	1
K1J35DS	20-32	2
K1J35S	6-114	12
K1R5J20DS	20-21	2

PART NUMBER	FIG.-ITEM	QTY
K10J20S	4-165	4
K100J10S	4-93	4
K100J20S	3-5	8
K120J10S	13-141	1
K15J20S	20-13	2
K150J15S	2-67	11
K18J15KS	6-131	1
K1913-06	2-83	5
K1913-08	2-88	4
K2R2J20S	4-25	3
K2R2J35KS	7-17	1
K2R2J35S	5-41	1
K22J15S	4-58	4
K3R3J15S	4-83	1
K3000-06	2-80	1
K4R7J35S	4-89	10
K47J20S	4-29	12
K47J35S	4-150	2
K68J20S	4-111	4
LHTA51M2860-40	11-109	4
L888M1333-3	4-151	2
MA4394	14-23A	4
MA4529	14-15A	4
MC80V102AM	14-9	1
MEA11258D	18-28	1
MEA13504D	18-29	1
MEA16407D	18-30	1
MEA177120D	18-36	1
MEA1782D	13-192	1
MEA20334D	18-31	1
MEA222700D	13-193	1
MEA26622D	18-32	1
MEA35052D	18-33	1
MEA49615D	18-34	1
MEA79675D	18-35	1
MS16225-11	16-37	1
MS16632-1012	2-2	2
MS20365D440A	2-7	9
MS20426AD2-2	11-109	7
MS20426AD3-2	13-216	2
MS20426AD3-3	2-80	27
MS20426AD3-4	2-84	17
MS20470AD3-3	2-83	4
MS25281-7P	9-55	1
MS35200-1	9-122	13
MS35200-11	6-148	1
MS35200-12	4-55	10
MS35200-14	9-55	1
MS35200-18	13-47	2
MS35200-2	4-12	47
MS35200-3	2-30	24
MS35200-5	4-54	4
MS35200-7	13-156	2
MS35200-8	4-180A	1
MS35214-14	2-74	2
MS35216-1	10-31	15
MS35216-10	2-7	2
MS35216-11	4-134	43
MS35216-12	2-7	30
MS35216-13	4-115	6
MS35216-14	2-36	6

PART NUMBER	FIG.-ITEM	QTY
MS35216-15	9-5	1
MS35216-17	13-11	1
MS35216-2	4-173	22
MS35216-22	2-3	4
MS35216-23	3-16	6
MS35216-25	1-2	2
MS35216-26	6-2	2
MS35216-3	3-1	14
MS35216-4	4-122	2
MS35216-5	20-54	12
MS35216-6	3-7	2
MS35333-69	7-35	1
MS35335-57	4-55	22
MS35335-58	4-221	1
MS35337-78	2-38	4
MS35337-79	3-16	2
MS35338-77	4-162	54
MS35338-78	4-4	14
MS35338-79	2-71	9
MS35338-81	4-224	13
MS35649-24	3-1	19
MS35649-44	4-4	20
M23-1000M	14-16	5
M9-3660	11-104	1
M9-3661	11-92	1
M9-3662	11-102	1
M9-3663	11-93	1
M9-3664	11-103	1
M9-3665	11-94	1
M9-3666	11-89	1
M9-3667	11-95	1
M9-3668	11-85	1
M9-3669	11-96	1
M9-3670	11-86	1
M9-3671	11-97	1
M9-3672	11-87	1
M9-3673	11-98	1
M9-3674	11-88	1
M9-3675	11-99	1
M9-3676	11-101	1
M9-3677	11-90	1
M9-3678	11-100	1
M9-3679	11-91	1
M9-4340	19-2	1
M9-4341	19-1	1
M9-4342	16-1	1
M9-4343	16-3	1
M9-4344	16-4	1
M9-4345	16-6	1
M9-4346	16-7	1
M9-4347	16-9	1
M9-4348	16-10	1
M9-4349	16-12	1
M9-4350	16-13	1
M9-4351	16-15	1
M9-4352	17-16	1
M9-4353	17-15	1
M9-4354	17-14	1
M9-4355	17-13	1
M9-4356	17-12	1
M9-4357	17-11	1

PART NUMBER	FIG.-ITEM	QTY
M9-4358	17-10	1
M9-4359	17-7	1
M9-4360	17-6	1
M9-4361	17-4	1
PS6467	3-8	1
PS8860	13-93A	1
RC07GF100K	4-194	6
RC07GF101K	9-60	5
RC07GF102K	3-3	17
RC07GF103K	3-3	30
RC07GF104K	4-132	14
RC07GF120K	13-32	2
RC07GF121K	9-24	1
RC07GF122K	4-16	10
RC07GF123K	10-4	3
RC07GF150K	2-69	9
RC07GF152K	4-87	6
RC07GF153K	9-81	1
RC07GF154K	4-30	8
RC07GF181K	4-86	11
RC07GF182K	4-21	10
RC07GF183K	17-49	1
RC07GF220K	9-32	3
RC07GF221K	4-7	5
RC07GF222K	4-74	11
RC07GF223K	6-103	6
RC07GF224K	4-78A	2
RC07GF270K	11-37	1
RC07GF271K	6-77	6
RC07GF272K	2-63	21
RC07GF331K	3-2	6
RC07GF332J	9-22	1
RC07GF332K	4-80	21
RC07GF333K	4-144	8
RC07GF334K	4-132A	1
RC07GF390K	9-85	1
RC07GF391K	7-18	3
RC07GF392K	5-25	6
RC07GF393K	6-126	5
RC07GF470K	4-163	16
RC07GF471K	13-98	2
RC07GF472K	4-138	17
RC07GF473K	3-11	5
RC07GF560K	4-193	5
RC07GF561K	9-30	12
RC07GF562K	2-65	16
RC07GF563K	4-61	9
RC07GF680K	6-91	9
RC07GF681K	4-108	1
RC07GF682K	9-83	8
RC07GF683K	4-60	2
RC07GF821K	13-111	1
RC07GF822K	4-192	16
RC07GF823K	4-27	3
RC20GF102K	2-62	2
RC20GF122K	15-7	1
RC20GF220K	20-42	1
RC20GF222K	4-24	2
RC20GF272K	6-110	1
RC20GF681K	20-24	2
RC32GF471J	2-56	1

PART NUMBER	FIG.-ITEM	QTY
RC32GF561K	19-20	1
RFTSM52B2	10-62	108
RFTSM71L2	6-156	5
RM52LHTA51-62	4-234	2
RN60B1001F	2-40	6
RN60B1002F	20-107	1
RN60B1003F	4-214	1
RN60B1004F	5-6	3
RN60B1102F	4-183	1
RN60B1103F	4-214	2
RN60B1210F	4-39	2
RN60B1212F	4-208	2
RN60B1332F	20-23	1
RN60B1472F	2-70	1
RN60B1473F	4-215	6
RN60B1623F	4-215	1
RN60B1782F	5-28	4
RN60B1960F	5-4	4
RN60B1961F	5-3	4
RN60B1962F	2-70	3
RN60B2151F	20-20	6
RN60B23R7F	4-36	1
RN60B2370F	4-33	2
RN60B2371F	20-59	2
RN60B2610F	6-25	2
RN60B2613F	5-8	3
RN60B2870F	4-64	1
RN60B3831F	20-58	2
RN60B4220F	4-70	5
RN60B4422F	5-9	2
RN60B5620F	4-103	2
RN60B6812F	6-97	1
RN60B7500F	4-101	2
RN60B7502F	4-59	3
RN60B8251F	20-33	1
RN60B8252F	4-214	1
RN60B8662F	5-59	4
RN60B9090F	4-71	2
RN60B9092F	6-76	1
RN60D1213F	4-214	AR
RN60D1333F	4-215	AR
RSM1B400R0F	11-54	3
RSM1B560R0F	11-68	5
RS1A510R0G	13-187	5
RS931-3E	8-19	1
RW69V100	9-56	1
RW69V151	16-49	2
RW69V3R3	4-23	2
RW69V3R9	4-23	1
RW69V331	7-7	1
RW69V4R7	15-10	1
RW69V5R6	15-10	1
RW69V681	2-56	1
R4008X5-32	20-129	2
SDB1K01473M	7-15	1
SE73CADPL	13-219	1
SKT41WHT	4-50	10
SK801460X5T0801P	10-67	66
SL157-197	14-47	36
SL158-198	4-228	97
SL173-197	4-229	144

PART NUMBER	FIG.-ITEM	QTY
SL174-198	4-227	76
SL180-231	14-47B	1
SL283-230	20-123	81
SPL4040-2HOT TINNED	9-100	28
SPL4040-4HOT TINNED	9-53B	18
STA552-1	13-24	4
ST10017-4	8-23	1
SZ886	15-8	1
S13022	2-8	30
S3FCHHP37L01	8-10	8
TDC11F4C	8-18	1
TITM1-4 1K PORM10PCT	20-5	2
TXBP032-037-3	6-29	6
T147	5-77	1
VCJ1022	14-30	4
VC21G	10-6	2
WEE100	16-33	12
X332-2	9-109	1
X421-1	9-100	3
1-4M6-2AZ5	9-33	1
1ADU1S2PORM2PCTE	5-34	5
1ADU1S4PORM2PCTE	5-57	7
1N1897R	7-31	1
1N270	3-9	43
1N3032A	4-159	1
1N3253	4-118	1
1N3255	2-51	4
1N457	4-2	93
1N457A	13-94	2
1N484B	18-1	27
1N647	2-64	36
1N755A	4-14	4
1N758A	2-68	1
1N816	13-83	1
1N82A	10-38	1
1N965B	13-68	1
1P4-26A	10-61	6
10F12	13-194	1
10F13	13-197	1
100-200-14-2	13-216	1
100-200-2-0	9-126	1
10100-125	11-1	2
10100-126	10-40	5
10100-127	17-36	1
10100-128	11-36	1
10100-131	16-37	2
10102-110	11-9	21
10102-121	10-42	1
102-130	11-112	59
10404-28	13-31	1
1065CADPL	4-4	2
1101A	4-224	15
118P22492S4	6-135	1
151D115X9020W2	7-16	1
151D116X9015X2	6-23	1
151D163X0035A2	4-88	1
151D166X0010B2	5-26	2
151D206X9010X2	6-22	1
151D345X0035B2	4-66	5
151D345X9035X2	6-98	2
151D505X9020X2	4-72	1
151D505X9035Y2	6-119	2
151D506X0010R2	6-123	1
151D755X0020B2	4-130	1
151D905X9015X2	6-27	1
151D905X9035Y2	4-99	2
1550S30000-5PCT	13-69	1
1704-03-00-4102	13-202	8
1714-05-00-4102	4-11	11
183-2324-00	2-8	20
184-7724-00	13-43A	1
1840-02	17-3	1
1914-05-00-2480	9-106	8
2N1285	9-102	3
2N174	9-111	1
2N2201	3-1	3
2N2362	11-2	4
2N2386	5-39	4
2N2398	10-3	7
2N2405	4-125	1
2N328A	3-10	1
2N333	9-115	2
2N341	9-110	1
2N525	9-118	1
2N657A	4-125	3
2N697	3-14	45
2N697	13-50	10
2N741A	10-21	1
2N887	2-66	1
200L1-202	13-156	1
20418-2	6-150	4
20419	2-35	6
2104-04-01-2520N	4-115	10
2104-06-02-2520N	3-16	2
22R3T51EG	4-15	3
224L1-103	20-52	2
224L1-501	20-50	1
224L1-502	3-7	4
224L1-503	4-54	2
240-1036-00	4-180	2
241-0528-00P	13-105	1
249-1386-00	2-37	2
2559	11-111	7
278-1823-00	13-150	1
278-1826-00	13-146	2
278-1845-00	13-144	1
280-1998-00	9-125	1
28010-2	2-6	1
29F2221G2	15-4	1
290-4465-00	10-26	1
3SAF1305	20-77	1
3SAH-1173-A2	2-6	1
30-1	2-73	4
302-0007-00	2-74	2
302-0638-020	2-2	4
303-1021-00	13-51	1
305-0043-00	9-126	2
305-0045-00	20-124	1
310-0044-00	13-144	8

PART NUMBER	FIG.-ITEM	QTY
310-0046-00	6-2	6
310-0048-00	2-46	2
310-0060-00	4-224	15
310-0075-00	3-6	29
310-0081-00	14-31	4
310-0396-00	13-1	20
310-6320-00	9-100	3
312-0005-00	13-155	2
312-0007-00	13-15	2
313-0002-00	3-1	2
313-0045-00	2-71	6
324-0580-00	8-12	2
33C41	13-186	4
330-2284-00	9-122	1
330-2285-00	9-121	1
330-3677-00	1-2	2
3307	9-130	13
3307X	3-19	45
334-0271-00	9-106	5
334-0282-00	4-11	14
334-0287-00	2-73	4
340-0641-00	1-4	4
340-0644-00	11-105	2
343-0035-00	1-4	8
343-0143-00	8-32	2
343-0172-00	6-1	4
343-0297-00	9-1	14
343-0298-00	3-6	1
343-0393-00	4-180	1
343-2642-00	11-105	2
347-0022-00	9-100	6
347-0024-00	8-20	9
347-1268-00	1-1	2
352-9939-00	2-85	1
353-2894-00	13-95	2
389-77-10	13-201A	3
4M17Z5	9-53	1
4007-4HOTTINNED	6-30	5
4007-8HOTTINNED	10-24	5
406-1	9-112	1
422-04-22-034-113	9-8	1
43D56C	13-105	1
491CADPL	4-230	1
5005-50	8-39	1
502-1515-002	9-55	1
502-6005-002	10-16	4
503-4750-001	8-11	2
503-4934-001	10-16	4
503-4935-001	10-59	4
503-4970-001	2-3	2
506-6072-002	5-75	3
506-8501-00	13-204	1
5105-9	5-75	3
5116	2-82	4
5133-25C	8-17	1
5144-15MD	2-46	4
522-2450-00	1-	1
522-2450-011	1-	1
522-2450-012	1-	1
522-2450-013	1-	1

PART NUMBER	FIG.-ITEM	QTY
522-2450-014	1-	1
522-2450-015	1-	1
522-2450-016	1-	1
522-2450-018	1-	1
522-2494-00	1-4	1
522-3195-00	1-6	1
522-3196-005	1-7	1
522-3197-00	1-5	1
522-3197-011	1-5	1
538002C0P089R	17-1	1
540-9004-003	13-182	1
540-9006-003	13-183	1
540-9035-003	20-84	3
540-9036-003	13-15	10
540-9043-003	13-45	3
540-9044-003	9-12	2
540-9166-003	13-14	2
541-5177-002	20-72	1
541-5179-002	2-38	2
541-5989-002	8-28	2
542-6124-002	8-8	1
542-6126-002	8-9	1
542-6128-002	8-6	1
542-6130-002	8-13	1
542-6131-002	8-16	1
542-6132-002	8-15	1
542-6133-002	8-	1
542-6136-002	8-31	2
542-6137-002	8-22	6
542-6151-003	8-14	1
545-7533-003	1-2	1
546-8186-003	2-46	4
547-5305-002	2-47	1
548-3945-00	9-11	1
548-3947-00	9-139	1
548-3951-002	9-1	1
548-3952-002	9-9	1
548-3953-00	10-65	6
548-3954-002	1-2	1
548-3958-002	10-23	1
548-3959-002	10-43	2
548-3960-002	10-15	4
548-3964-003	12-1	1
548-3970-004	10-71	1
548-3971-004	10-53	1
548-3972-004	9-138	1
548-3973-004	9-124	1
548-3976-005	9-2	1
548-6769-003	12-22	1
548-6770-003	12-5	1
548-7830-003	13-9	1
548-7831-003	13-1	1
548-9539-002	4-224	15
549-3416-002	9-3	1
549-3519-002	1-1A	2
549-3905-002	2-2	2
549-3906-002	2-2	1
549-3907-002	2-2	1
549-3936-004	2-2	1
549-6138-002	4-57	1
549-6295-002	11-107	1

PART NUMBER	FIG.-ITEM	QTY
549-6300-003	11-39	1
549-6605-00	4-5	2
549-6606-00	4-55	1
549-6608-00	4-1	1
549-6613-003	4-12	4
549-6614-003	5-33	1
549-6615-003	4-114	3
549-6618-003	4-53	1
549-6619-003	4-49	1
549-6620-004	4-225	1
549-6624-00	4-235	1
549-6626-005	5-81	1
549-6627-005	5-73	1
55C30	13-157	2
553-2343-00	6-3	1
553-2344-00	6-6	1
553-2345-00	6-149	1
553-2348-002	8-26	3
553-2349-002	8-30	2
553-2350-002	8-4	1
553-2352-002	8-7	1
553-2355-00	6-72	1
553-2356-002	8-34	1
553-2361-002	8-38	1
553-2362-003	8-1	1
553-2364-003	6-11	1
553-2369-003	6-4	1
553-2370-004	8-29	1
553-2373-004	7-42	1
553-2374-004	7-34	1
553-2380-005	8-40	1
553-2381-005	8-	1
553-2382-005	6-157	1
553-2384-00	6-152	1
553-2385-005	8-5	1
553-2411-002	6-2	6
553-6249-004	1-2	1
553-6311-005	11-124	1
553-6312-005	11-106	1
553-6436-003	13-41	1
553-6452-00	2-28	1
553-6456-002	2-7	1
553-6457-002	2-87	4
553-6458-002P	14-14	3
553-6459-002	17-64	1
553-6460-002	17-47	1
553-6461-002	16-16	1
553-6462-002	13-11	1
553-6463-002	13-47	2
553-6464-002	17-47A	1
553-6472-002	9-5	1
553-6474-002	2-46	2
553-6475-002	2-46	2
553-6478-003	13-12	1
553-6479-003	13-10	1
553-6480-003	13-153	1
553-6481-003	13-151	1
553-6482-003	13-48	1
553-6483-003	13-46	1
553-6484-003P	15-17	1
553-6485-003P	15-13	1
553-6487-00	13-180	1
553-6488-003P	2-5	1
553-6489-003P	16-2	2
553-6490-003P	16-8	2
553-6491-003P	3-22	1
553-6492-003P	3-22	1
553-6493-003P	3-17	1
553-6494-003P	3-17	1
553-6495-003	13-167	1
553-6496-003	13-43	1
553-6498-003	9-6	1
553-6499-003	9-4	1
553-6502-004	19-35	1
553-6503-004	19-25	1
553-6504-004	18-40	1
553-6505-004	18-37	1
553-6510-004	14-48	1
553-6511-004	14-44	1
553-6512-004P	13-13	1
553-6513-004	13-154	1
553-6514-004P	13-49	1
553-6515-004	13-42	1
553-6516-004	13-181	1
553-6517-004	2-46	1
553-6518-004	2-45	1
553-6522-005P	16-86	1
553-6523-005P	16-68	1
553-6526-005P	17-84	1
553-6527-005P	17-66	1
553-6529-005	2-91	1
553-6530-005	2-79	1
553-6531-005P	13-220	1
553-6532-005P	13-212	1
553-6533-005	1-3	1
553-6534-005	1-3	1
553-6534-015	1-3	1
553-6537-003P	9-7	1
553-6541-002	13-44	1
553-9304-00	2-28	1
553-9305-002	2-41	1
553-9306-002	2-44	1
553-9307-003	2-39	1
553-9308-003	2-42	1
553-9776-003	1-1	1
554-3948-003	2-2	1
554-6756-002	14-21A	1
60E193	4-217	2
665-55-113	8-23	1
68-1660-26	3-7	48
68-1660-40	9-2	32
68NA7-68-62	2-89	4
705-0690-00	18-36	1
705-0691-00	18-35	1
705-0692-00	18-34	1
705-0693-00	18-33	1
705-0694-00	18-32	1
705-0695-00	18-31	1
705-0696-00	18-30	1
705-0697-00	18-29	1
705-0698-00	18-28	1
714-1755-00	13-185	1

PART NUMBER	FIG.-ITEM	QTY
714-1756-00	13-57	1
756-3806-00	20-	1
756-3807-002	20-129	1
756-3809-00	20-124	1
756-3810-002	20-83	1
756-3811-002	20-128	1
756-3814-00	20-130	1
756-3815-00	20-119	1
756-3816-005	2-4	1
756-3838-005	1-3	1
756-3838-015	1-3	1
756-9908-002	2-74	1
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76-0102-67	4-179	1
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815501X5G0203P	9-34	10
855502X5G0103P	10-14	3
905-45-55	9-123	1
913-3104-00	13-27	5
92-0131-00	3-15	1
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R3	RC07GF332K	4-80
R4	RC07GF102K	4-82
R5	RC07GF181K	4-86
R6	RC07GF472K	4-138
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R8	RC07GF562K	4-20
R9	RC07GF562K	4-177
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R11	RC07GF221K	4-26
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R20	RC07GF333K	4-147
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R23	RC07GF333K	4-145
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R25	RC07GF224K	4-78B
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R78	RN60B1473F	5-15
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R82	RC07GF154K	4-30
R83	RC07GF222K	4-74
R83	RC07GF562K	4-74
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R9	RC07GF332K	6-112
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R97	RN60B1210F	6-17
R98	RC07GF563K	6-70
R119	RC07GF154K	6-19
R120	RC07GF222K	6-65
R120	RC07GF562K	6-65
R121	RC07GF822K	6-136
R122	RC07GF222K	6-64
R123	RC07GF100K	6-140
R124	RC07GF680K	6-96
R125	RC07GF680K	6-95
R126	RC07GF822K	6-138
R127	RN60B7502F	6-24
R129	RN60B6812F	6-97
T1	DOT38	6-28
T2	94-0925-00	6-145
T3	D10404	6-146
T4	DOT38	6-147
T5	DOT38	7-28
T6	DOT39	7-22
XQ1 THRU XQ3	3307X	6-153
XQ4,XQ5	1101A	6-90
XQ6 THRU XQ9	3307X	7-35
XQ16	3307X	6-153
XQ17,XQ18	1101A	6-90
XQ23	3307X	6-153
XQ24,XQ25	1101A	6-90

51X-4B GLIDE SLOPE RADIO RECEIVER

SYMBOL	PART NUMBER	FIG.-ITEM
C1	DA855-013	10-31
C2	GA-27UUFPORM5PCT	10-32
C3	DA855-013	10-33
C4	GA-27UUFPORM5PCT	10-34
C5	DA855-013	10-35
C6	GA-27UUFPORM5PCT	10-36
C7	DA855-013	10-37
C8	DM15C050J01	10-41
C9	DM15F471J03	10-39
C10	855502X5G0103P	10-14
C11	SK801460X5T0801P	10-67

SYMBOL	PART NUMBER	FIG.-ITEM
C12	SK801460X5T0801P	10-68
C13	SK801460X5T0801P	10-69
C14	GA-33UUFPORM5PCT	11-35
C15	VC21G	10-6
C16	CK60AX471M	11-38
C17	VC21G	10-9
C18	DM15C150J01	10-5
C19	CK60AX471M	11-29
C20	CK60AX471M	11-33
C21	CL25BN250UP3	9-55A
C22	815501X5G0203P	9-43
C23	CM05E470J03	10-25
C24	CM05E360J03	10-22
C25	CK62AW472M	10-27
C26	815501X5G0203P	9-58
C27	KR47J35KS	9-59
C28	815501X5G0203P	9-61
C29	GA10-0UUFPORM5PCT	9-66
C30	815501X5G0203P	9-44
C31	815501X5G0203P	9-41
C32	815501X5G0203P	9-65
C33	KR47J35KS	9-69
C34	GA10-0UUFPORM5PCT	9-72
C35	815501X5G0203P	9-37
C36	815501X5G0203P	9-73
C37	KR47J35KS	9-77
C38	GA10-0UUFPORM5PCT	9-78
C39	815501X5G0203P	9-34
C40	CM05E680J03	9-80
C41	K150J15S	9-105
C42	815501X5G0203P	9-79
C43	K150J15S	9-99
C44	K47J20S	9-116
C45	K150J15S	9-14
C46	K150J15S	9-13
C47	K150J15S	9-101
C48	CM05F221J03	10-1
C49	DM15C050J01	10-46
C50	SK801460X5T0801P	12-6
C51	SK801460X5T0801P	12-7
C52	SK801460X5T0801P	12-8
C53	SK801460X5T0801P	12-9
C54	SK801460X5T0801P	12-10
C55	SK801460X5T0801P	12-11
C56	SK801460X5T0801P	12-12
C57	SK801460X5T0801P	12-13
C58	SK801460X5T0801P	12-14
C59	SK801460X5T0801P	12-15
C60	SK801460X5T0801P	12-16
C61	SK801460X5T0801P	12-17
C62	SK801460X5T0801P	12-18
C63	SK801460X5T0801P	12-19
C64	SK801460X5T0810P	12-20
C65	SK801460X5T0801P	12-21
C66	CM05F221J03	10-48
C67	DM15C150J01	10-2
C68	CK60AX471M	11-42
C69	SK801460X5T0801P	11-122
C70	GA6-2UUFPORM5PCT	9-49
C71	K4R7J35S	9-54
C72	SK801460X5T0801P	11-113

SYMBOL	PART NUMBER	FIG.-ITEM
C73	SK801460X5T0801P	11-114
C74	SK801460X5T0801P	11-115
C75	SK801460X5R0801P	11-116
C76	SK801460X5T0801P	11-117
C77	SK801460X5T0801P	11-118
C78	SK801460X5T0801P	11-119
C79	SK801460X5T0801P	11-120
C80	SK801460X5T0801P	11-121
C81	CK60AX471M	11-48
C85	CM05F221J03	11-34
C86	CL35BQ0R5MP3	9-54A
C87	K4R7J35S	9-53A
C88	CK60AX471M	11-45
CR1	1N270	11-8
CR2	1N270	11-7
CR3	1N270	11-6
CR4	1N270	11-4
CR5	1N270	11-3
CR6	1N270	11-49
CR7	1N270	11-46
CR8	1N270	11-43
CR9	1N270	11-40
CR10	1N647	11-81
CR11	1N647	11-77
CR12	1N647	11-73
CR13	1N647	11-69
CR14	1N82A	10-38
CR15	1N270	9-28
CR16	1-4M6-2AZ5	9-33
CR17	1N270	9-94
CR18	1N270	9-93
CR19	1N270	9-92
CR20	1N270	9-90
CR21	1N457	9-18
CR22	4M17Z5	9-53
CR23	1N3255	9-50
CR24	1N647	11-66
CR25	1N647	11-63
CR26	1N647	11-59
CR27	1N647	11-55
CR28	1N647	11-51
CR29	1N457	11-82
CR30	1N457	11-79
CR31	1N457	11-78
CR32	1N457	11-75
CR33	1N457	11-74
CR34	1N457	11-71
CR35	1N457	11-70
CR36	1N457	11-67
CR37	1N457	11-65
CR38	1N457	11-83
CR39	1N457	11-60
CR40	1N457	11-57
CR41	1N457	11-56
CR42	1N457	11-53
CR43	1N457	11-52
CR44	1N457	11-64
FL1	406-1	9-112
FL2	X332-2	9-109
FL3	60E193	9-12
J1	CN401F80BWHT	10-58

SYMBOL	PART NUMBER	FIG.-ITEM
J2	CN401F80BWHT	10-57
J3	CN401F80BWHT	10-56
J4	CN401F80BWHT	10-55
J5	CN401F80BWHT	9-133
J6	CN401F80BWHT	9-134
L1	548-3960-002	10-19
L2	548-3960-002	10-18
L3	548-3960-002	10-17
L4	548-3960-002	10-15
L5	10100-126	10-40
L6	10102-121	10-42
L7	549-6300-003	11-39
L8	548-3959-002	10-43
L9	548-3959-002	10-49
L10	10100-125	11-1
L11	10102-110	11-9
L12	10102-110	11-11
L13	10102-110	11-13
L14	10102-110	11-16
L15	10102-110	11-17
L16	10102-110	11-24
L17	10102-110	11-25
L18	10102-110	11-27
L19	10102-110	11-28
L20	10100-126	11-47
L21	10102-110	11-26
L22	10100-126	11-44
L23	10100-126	11-41
L24	10100-126	11-50
L25	548-3958-002	10-23
L26	10100-128	11-36
P1	DPA24W2-34P1	12-3
Q1	2N2362	11-2
Q2	2N2398	10-12
Q3	2N741A	10-21
Q4	2N1285	9-108
Q5	2N1285	9-104
Q6	2N1285	9-102
Q7	2N333	9-117
Q8	2N333	9-115
Q9	2N525	9-118
Q10	2N697	9-97
Q11	2N697	9-96
Q12	2N174	9-111
Q13	2N341	9-110
Q14	2N2398	10-3
Q15	2N2398	10-8
R1	RC07GF561K	11-10
R2	RC07GF561K	11-12
R3	RC07GF561K	11-14
R4	RC07GF561K	11-15
R5	RC07GF561K	11-18
R6	RC07GF561K	11-20
R7	RC07GF561K	11-21
R8	RC07GF561K	11-22
R9	RC07GF822K	11-19
R10	RSM1B560R0F	11-84
R11	RSM1B560R0F	11-80
R12	RSM1B560R0F	11-76
R13	RSM1B560R0F	11-72

SYMBOL	PART NUMBER	FIG.-ITEM
R14	RSM1B560R0F	11-68
R15	RC07GF103K	11-62
R16	RC07GF123K	11-30
Q17	RC07GF682K	11-31
R18	RC07GF472K	11-32
R19	RC07GF472K	10-50
R20	RC07GF682K	10-51
R21	RC07GF470K	10-47
R22	RC07GF561K	10-10
R23	RC07GF272K	10-11
R24	RC07GF682K	10-13
R24	RC07GF822K	10-13
R25	RC07GF470K	9-47
R26	RC07GF470K	9-64
R27	RC07GF103K	9-42
R28	RC07GF222K	9-45
R29	RC07GF102K	9-48
R30	RC07GF272K	10-29
R31	RC07GF182K	10-30
R32	RC07GF470K	9-46
R33	RC07GF101K	9-60
R34	RC07GF272K	9-63
R35	RC07GF822K	9-62
R36	RC07GF470K	9-39
R37	RC07GF470K	9-40
R38	BJ24248	9-106
R39	RC07GF101K	9-67
R40	RC07GF272K	9-68
R41	RC07GF822K	9-70
R42	RC07GF392K	9-38
R43	RC07GF220K	9-35
R44	RC07GF822K	9-71
R45	RC07GF472K	9-74
R46	RC07GF182K	9-75
R47	RC07GF220K	9-32
R48	RC07GF153K	9-81
R49	RC07GF122K	9-82
R50	RC07GF271K	9-29
R51	BJ24248	9-114
R52	RC07GF332K	9-31
R53	RC07GF332K	9-27
R54	BJ24238	9-13
R55	RC07GF332K	9-25
R56	RC07GF220K	9-76
R57	RC07GF332K	9-26
R58	RC07GF472K	9-36
R59	RC07GF332J	9-22
R59	RC07GF562K	9-22
R60	RC07GF121K	9-24
R61	RC07GF182K	9-23
R62	RC07GF682K	9-83
R63	RC07GF272K	9-20
R64	RC07GF390K	9-85
R65	RC07GF221K	9-86
R66	RC07GF392K	9-88
R67	RC07GF470K	9-21
R68	RC07GF470K	9-89
R69	RC07GF150K	9-19
R70	RC07GF103K	9-84
R71	RC07GF103K	9-87
R72	RC07GF472K	10-44

SYMBOL	PART NUMBER	FIG.-ITEM
R73	BJ24243	9-119
R74	RC07GF470K	9-16
R75	RN60B4220F	9-17
R76	RN60B4220F	9-15
R77	BJ24240	9-120
R78	RC07GF102K	9-10
R81	RC07GF331K	9-57
R82	RW69V100	9-56
R83	RC07GF271K	9-52
R84	RC07GF272K	9-51
R85	RC07GF561K	9-30
R86	RC07GF682K	10-45
R88	RC07GF123K	10-7
R89	RC07GF123K	10-4
R90	RC07GF102K	10-28
R91	RSM1B400R0F	11-54
R92	RSM1B400R0F	11-61
R93	RC07GF122K	11-5
R94	RC07GF122K	11-23
R95	RSM1B400R0F	11-58
R96	RC07GF270K	11-37
R97	RC07GF101K	9-67A
R98	RC07GF101K	9-67B
RT1	997F18	9-91
T1	X421-1	9-107
T2	X421-1	9-103
T3	X421-1	9-100
T4	A12565	9-95
XQ1	3307	11-110
XQ2	3307	10-54
XQ3	3307X	10-60
XQ4 THRU XQ6	3307	9-130
XQ7 THRU XQ9	3307X	9-131
XQ10,XQ11	1101A	9-98
XQ13	3307X	9-131
XQ14,XQ15	3307	10-54
X1	M9-3677	11-90
Y2	M9-3679	11-91
Y3	M9-3661	11-92
Y4	M9-3663	11-93
Y5	M9-3665	11-94
Y6	M9-3667	11-95
Y7	M9-3669	11-96
Y8	M9-3671	11-97
Y9	M9-3673	11-98
Y10	M9-3675	11-99
Y11	M9-3678	11-100
Y12	M9-3676	11-101
Y13	M9-3662	11-102
Y14	M9-3664	11-103
Y15	M9-3660	11-104
Y16	M9-3668	11-85
Y17	M9-3670	11-86
Y18	M9-3672	11-87
Y19	M9-3674	11-88
Y20	M9-3666	11-89
Y21	290-4465-00	10-26

SYMBOL	PART NUMBER	FIG.-ITEM
	51X-4 VOR RADIO RECEIVER	
C1	MA4394	14-27A
C1	MA4529	14-27A
C2	M23-1000M	14-26
C4	VCJ1022	14-30
C5	GA2-0UUFPORM5PCT	14-4A
C6	MA4394	14-23A
C6	MA4529	14-23A
C7	M23-1000M	14-24
C8	CK60AW102M	14-40
C9	VCJ1022	14-31
C11	VCJ1022	14-33
C12	MA4394	14-20A
C12	MA4529	14-20A
C13	M23-1000M	14-19
C14	CK60AW102M	14-8
C15	M23-1000M	14-42A
C16	CK60AW102M	14-41
C17	CK60AW102M	14-18
C18	MC80V102AM	14-9
C19	VCJ1022	14-36
C20	MA4394	14-15A
C20	MA4529	14-15A
C21	M23-1000M	14-16
C22	CK60AW102M	14-11
C23	CK60AW102M	14-13
C26	CK60AW102M	17-31
C26	CM05E200J03	17-31
C26	CM05E470J03	17-31
C26	DM15C100J01	17-31
C27	CK60AW102M	17-63
C27	855502X5G0103P	17-63
C28	CK60AW102M	17-30
C29	DM10C050J	17-32
C29	DM15C100J01	17-32
C30	CK60AW102M	17-35
C31	SK801460X5T0801P	17-77
C32	538002C0P089R	17-1
C33	DM15C100J01	17-9
C34	CK60AW102M	17-5
C35	DM15C100J01	17-28
C36	SK801460X5T0801P	17-75
C37	SK801460X5T0801P	17-76
C38	SK801460X5T0801P	17-74
C39	SK801460X5T0801P	17-72
C40	SK801460X5T0801P	17-73
C41	SK801470X5T0801P	17-71

SYMBOL	PART NUMBER	FIG.-ITEM
C42	SK801460X5T0801P	17-70
C43	SK801460X5T0801P	17-69
C44	SK801460X5T0801P	17-68
C45	SK801460X5T0801P	17-67
C47	CK60AW102M	16-23
C48	CM05F331J03	16-20
C49	CM05F331J03	16-22
C50	SK801460X5T0801P	16-76
C51	CM05E200J03	16-19
C52	CM05F221J03	16-18
C53	CK60AW102M	16-14
C54	SK801460X5T0801P	16-74
C55	SK801460X5T0801P	16-73
C56	SK801460X5T0801P	16-72
C57	SK801460X5T0801P	16-71
C58	SK801460X5T0801P	16-70
C59	SK801460X5T0801P	16-78
C60	SK801460X5T0801P	16-77
C61	SK801460X5T0801P	16-81
C62	SK801460X5T0801P	16-80
C63	SK801460X5T0801P	16-79
C65	STA552-1	19-10
C66	CM05E470J03	19-14
C67	CM05F101J03	19-3
C68	DM15F471J03	19-23
C69	DM20F222J500WV	19-7
C70	CM05F221J03	19-6
C71	SK801460X5T0801P	19-32
C72	SK801460X5T0801P	19-30
C73	SK801460X5T0801P	19-31
C75	SK801460X5T0801P	13-168
C76	SK801460X5T0801P	13-169
C77	SK801460X5T0801P	13-170
C78	SK801460X5T0801P	13-171
C79	SK801460X5T0801P	13-172
C80	SK801460X5T0801P	13-179
C81	SK801460X5T0810P	13-178
C82	SK801460X5T0801P	13-174
C83	SK801460X5T0810P	13-177
C84	SK801460X5T0810P	13-176
C85	SK801460X5T0801P	13-175
C86	SK801460X5T0801P	13-173
C88	GA6-2UUFPORM5PCT	13-39
C89	CM05F101J03	13-35
C90	913-3104-00	13-38
C91	CM05F101J03	16-17
C92	913-3104-00	13-34
C93	DM15C100J01	13-29
C94	CL65CG181MP3	13-90
C95	CM05F331J03	13-22
C96	STA552-1	13-24
C97	CM05E470J03	19-8
C98	K4R7J35S	13-17
C99	CM05F331J03	13-110
C101	CM05F271J03	13-109
C102	K1J35S	13-108
C103	KR022J35S	13-116
C104	K1J35S	13-118
C105	KR022J35S	13-120
C106	K4R7J35S	13-122

SYMBOL	PART NUMBER	FIG.-ITEM
C107	K1J35S	13-123
C108	K1J35S	13-126
C109	K4R7J35S	13-128
C110	K1J35S	13-132
C111	K1J35S	13-136
C112	K120J10S	13-141
C113	K1J35S	13-140
C114	K1J35S	13-133
C115	DM15F510J03	13-53
C116	CK62AW472M	13-56
C117	STA552-1	13-70
C118	K1J35S	13-77
C119	STA552-1	13-62
C121	CL25BG400UP3	13-59
C122	K150J15S	13-67
C124	913-3104-00	13-87
C125	K150J15S	13-164
C125	K100J20S	13-164
C126	K1J35S	13-26
C127	K100J20S	13-88
C128	K100J20S	13-79
C129	913-3104-00	13-58
C130	K150J15S	13-3
C131	913-3104-00	13-27
C132	33C41	19-22
C133	33C41	17-27
C134	33C41	16-24
C135	DM15F471J03	13-124
C136	DM15F471J03	13-131
C137	55C30	13-158
C138	55C30	13-157
C139	29F2221G2	15-4
C140	CK62AW472M	13-91
C141	CK62AW472M	13-86
C142	33C41	13-186
C143	K100J20S	13-5
C144	K100J20S	13-6
C145	K100J20S	13-7
C146	K150J15S	13-2
C148	184-7724-00	13-43A
C149	855502X5G0103P	13-93B
CR1	1N484B	18-1
CR2	1N484B	18-26
CR3	1N484B	18-27
CR4	1N484B	18-2
CR5	1N484B	18-25
CR6	1N484B	18-24
CR7	1N484B	18-3
CR8	1N484B	18-22
CR9	1N484B	18-23
CR10	1N484B	18-4
CR11	1N484B	18-21
CR12	1N484B	18-20
CR13	1N484B	18-5
CR14	1N484B	18-18
CR15	1N484B	18-19
CR16	1N484B	18-6
CR17	1N484B	18-17
CR18	1N484B	18-16
CR19	1N484B	18-7
CR20	1N484B	18-14
CR21	1N484B	18-15
CR22	1N484B	18-8

SYMBOL	PART NUMBER	FIG.-ITEM
CR23	1N484B	18-13
CR24	1N484B	18-12
CR25	1N484B	18-9
CR26	1N484B	18-10
CR27	1N484B	18-11
CR28	1N270	17-61
CR29	1N270	17-60
CR30	1N270	17-59
CR31	1N270	17-58
CR32	1N270	17-62
CR33	1N270	17-46
CR34	1N270	17-45
CR35	1N270	17-44
CR36	1N270	17-43
CR37	1N270	17-37
CR38	1N270	16-61
CR39	1N270	16-62
CR40	1N270	16-53
CR41	1N270	16-55
CR42	1N270	16-58
CR43	1N270	16-39
CR44	1N270	16-41
CR45	1N270	16-43
CR46	1N270	16-45
CR47	1N270	16-47
CR50	1N647	16-28
CR51	1N647	16-26
CR52	1N647	16-34
CR53	1N647	16-32
CR54	1N647	16-30
CR55	1N270	19-16
CR56	1N270	19-17
CR57	1N647	19-11
CR58	1N647	19-9
CR59,CR60	SZ886	15-8
CR61	1N3255	15-6
CR62	1N270	13-55
CR63	353-2894-00	13-102
CR64	1N270	13-74
CR65	1N270	13-96
CR66	1N270	13-97
CR67	1N647	13-163
CR68	1N647	13-162
CR69	1N647	13-161
CR70	1N647	13-160
CR71	1N647	13-159
CR72	1N816	13-83
CR73	353-2894-00	13-95
CR74	1N270	13-94
CR74	1N457A	13-94
CR75	1N965B	13-68
CR76	1N270	13-94A
CR76	1N457A	13-94A
CR77	PS8860	13-93A
E76 THRU E79	G4777-10	14-29
FL1	10F12	13-194
FL2	10F13	13-197
FL3	43D56C	13-105
FL3	241-0528-00P	13-105
FL4	BC3179	13-196
L1	553-6458-002P	14-25
L2	553-6458-002P	14-22
L5	553-6458-002P	14-14

SYMBOL	PART NUMBER	FIG.-ITEM
L8	10102-110	17-57
L9	553-6460-002	17-47
L10	1840-02	17-3
L11	10100-125	17-8
L12	10100-127	17-36
L13	10102-110	17-55
L14	10102-110	17-54
L15	10102-110	17-53
L16	10102-110	17-52
L17	10102-110	17-56
L18	10102-110	17-42
L19	10102-110	17-41
L20	10102-110	17-40
L21	10102-110	17-39
L22	10102-110	17-38
L24	MS16225-11	16-37
L24	10100-131	16-37
L25	J301-500	16-36
L26	WEE100	16-33
L27	553-6461-002	16-16
L28	553-6490-003P	16-11
L29	553-6490-003P	16-8
L30	553-6489-003P	16-5
L31	553-6489-003P	16-2
L32	WEE100	16-48
L33	WEE100	16-60
L34	WEE100	16-64
L35	WEE100	16-50
L36	WEE100	16-54
L37	WEE100	16-57
L38	WEE100	16-38
L39	WEE100	16-40
L40	WEE100	16-42
L41	WEE100	16-44
L42	WEE100	16-46
L44	J301-500	19-15
L45	J301-500	19-18
L46	10100-131	19-24
L48	J301-500	13-142
L49	J301-1000	13-54
L50	10404-28	13-31
P4	DMB21W1P	13-166
Q1	2N2398	14-34
Q2	2N2398	14-37
Q3	2N2398	17-29
Q4	2N2362	17-2
Q5	2N2362	16-21
Q6	2N2362	19-5
Q7	2N697	15-3
Q8	2N657A	15-2
Q9	2N2201	15-1
Q10	2N697	13-195
Q11	2N2398	13-107
Q12	2N697	13-143
Q13	2N697	13-145
Q14	2N697	13-147
Q15	2N697	13-149
Q16	2N697	13-78
Q17	2N697	13-50
Q18	2N697	13-104
Q19	2N697	13-198

SYMBOL	PART NUMBER	FIG.-ITEM
Q20	2N697	13-199
R1	RC07GF104K	14-1
R2	RC07GF104K	14-5
R3	RC07GF104K	14-7
R4	RC07GF472K	14-43
R5	RC07GF122K	14-32
R6	RC07GF272K	14-17
R7	RC07GF104K	14-10
R8	RC07GF104K	14-39
R9	RC07GF223K	14-38
R10	RC07GF222K	14-35
R12	MEA177120D	18-36
R12	705-0690-00	18-36
R13	MEA79675D	18-35
R13	705-0691-00	18-35
R14	MEA49615D	18-34
R14	705-0692-00	18-34
R15	MEA35052D	18-33
R15	705-0693-00	18-33
R16	MEA26622D	18-32
R16	705-0694-00	18-32
R17	MEA20334D	18-31
R17	705-0695-00	18-31
R18	MEA16407D	18-30
R18	705-0696-00	18-30
R19	MEA13504D	18-29
R19	705-0697-00	18-29
R20	MEA11258D	18-28
R20	705-0698-00	18-28
R21	RC07GF272K	17-51A
R22	RC07GF563K	17-48
R23	RC07GF223K	17-33
R23	RC07GF562K	17-33
R24	RC07GF272K	17-51
R25	RC07GF183K	17-49
R25	RC07GF393K	17-49
R26	RC07GF222K	17-34
R26	RC07FG562K	17-34
R27	RC07GF333K	17-50
R28	RW69V151	17-65
R29	RC07GF181K	17-24
R30	RC07GF181K	17-26
R31	RC07GF181K	17-22
R32	RC07GF181K	17-18
R33	RC07GF181K	17-20
R34	RC07GF103K	17-23
R35	RC07GF103K	17-25
R36	RC07GF103K	17-21
R37	RC07GF103K	17-17
R38	RC07GF103K	17-19
R41	RC07GF393K	16-66
R42	RC07GF562K	16-65
R43	RC07GF333K	16-67
R44	RW69V151	16-49
R45	RC07GF181K	16-27
R46	RC07GF181K	16-25
R47	RC07GF181K	16-35
R48	RC07GF181K	16-31
R49	RC07GF181K	16-29
R50	RC07GF103K	16-56
R51	RC07GF103K	16-52
R52	RC07GF103K	16-51
R53	RC07GF103K	16-63
R54	RC07GF103K	16-59
R56	RC07GF562K	19-13
R57	RC07GF822K	19-4
R58	RC07GF332K	19-12
R59	RC07GF103K	19-19
R60	RC07GF103K	19-21
R61	RC07GF561F	19-20
R63	RC07GF102K	15-9
R64	RC07GF122K	15-7
R65	RC07GF222K	15-11
R66	RW69VR6	15-10
R66	RW69V4R7	15-10
R68	MEA222700D	13-193
R69	MEA1782D	13-192
R69A	RN60B1623F	13-184
R70	200L1-202	13-156
R71	RS1A510R0G	13-187
R72	RS1A510R0G	13-188
R73	RS1A510R0G	13-189
R74	RS1A510R0G	13-190
R75	RS1A510R0G	13-191
R76	RC07GF272K	13-37
R77	RC07GF332K	13-36
R78	RC07GF182K	13-33
R79	RC07GF392K	13-30
R80	RC07GF120K	13-82
R81	RC07GF393K	13-23
R82	RC07GF102K	13-21
R83	RC07GF103K	13-25
R84	RC07GF272K	13-19
R85	RC07GF152K	13-18
R86	RC07GF152K	13-106
R87	RC07GF222K	13-114
R88	RC07GF821K	13-111
R89	RC07GF102K	13-112
R90	RC07GF682K	13-100
R91	RW69V3R3	13-81
R92	RC07GF470K	13-121
R93	RC07GF102K	13-113
R94	RC07GF102K	13-119
R95	BJ24248	13-84
R96	RC07GF332K	13-129
R97	RC07GF272K	13-125
R98	RC07GF470K	13-127
R99	RC07GF471K	13-130
R100	RC07GF271K	13-137
R101	RC07GF271K	13-135
R102	RC07GF470K	13-138
R103	RC07GF680K	13-139
R104	BJ24246	13-63
R105	RC07GF104K	13-71
R106	RC07GF104K	13-72
R107	RC07GF104K	13-61
R108	RC07GF823K	13-75
R109	RC07GF104K	13-73
R110	RC07GF473K	13-76

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R111	BJ24246	13-52
R112	RC07GF391K	13-65
R113	RC07GF272K	13-66
R114	RC07GF560K	13-64
R115	RC07GF472K	13-80
R116	RC07GF103K	13-60
R117	1550S30000-5PCT	13-69
R118	RC07GF150K	13-89
R119	RC07GF150K	13-85
R120	RC07GF101K	13-101
R122	RC07GF822K	13-103
R123	RC07GF102K	13-93
R124	RC07GF331K	13-92
R124	RC07GF221K	13-92
R127	RC07GF472K	13-99
R128	RC07GF470K	13-4
R129	RC07GF471K	13-98
R129	RC07GF561K	13-98
R130	RC07GF152K	13-134
R133	RC07GF561K	13-20
R135	RC07GF470K	13-28
R136	RC07GF120K	13-32
R137	RC07GF472K	13-117
R138	RC07GF473K	13-180A
R140	RC07GF103K	13-40
RT1	714-1756-00	13-57
RT2	714-1755-00	13-185
T1	553-6459-002	17-64
T2	278-1845-00	13-144
T3	278-1826-00	13-146
T4	278-1826-00	13-148
T5	278-1823-00	13-150
T6	A14050	13-16
T7	554-6756-002	14-21A
TB1	553-6505-004	18-37
TB2	553-6485-003P	15-13
TB3	548-7830-003	13-9
XQ1,XQ2	3307	14-45
XQ3,XQ4	3307	17-80
XQ5	3307	16-69
XQ6	3307	19-28
XQ7,XQ8	3307X	15-15
XQ10 THRU XQ16	3307X	13-217
XQ18 THRU XQ20	3307X	13-217
Y1	M9-4352	17-16
Y2	M9-4353	17-15
Y3	M9-4354	17-14
Y4	M9-4355	17-13
Y5	M9-4356	17-12
Y6	M9-4357	17-11
Y7	M9-4358	17-10
Y8	M9-4359	17-7
Y9	M9-4360	17-6
Y10	M9-4361	17-4
Y11	M9-4342	16-1
Y12	M9-4343	16-3
Y13	M9-4344	16-4
Y14	M9-4345	16-6
Y15	M9-4346	16-7
Y16	M9-4347	16-9
Y17	M9-4348	16-10
Y18	M9-4349	16-12
Y19	M9-4350	16-13
Y20	M9-4351	16-15
Y21	M9-4341	19-1
Y22	M9-4340	19-2
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C1	DM42F563J03	20-108
C2	DM42F563J03	20-98
C3	DM42F563J03	20-91
C4	DM42F563J03	20-85
C5	CM05F332J03	20-16
C6	K1R5J20DS	20-106
C7	K15J20S	20-13
C9	K1R5J20DS	20-21
C10	CM06F332J03	20-27
C11	CM06F333J03	20-39
C12	K1J35DS	20-32
C13	K15J20S	20-35
C15	K1J35DS	20-93
C16	CM06F333J03	20-28
C17	CL25BN080UP3	20-40
CR1	1N457	20-12
CR2	1N457	20-1
CR3	1N457	20-111
CR4	1N457	20-110
CR5	1N457	20-19
CR6	1N457	20-104
CR7	1N457	20-103
CR8	1N457	20-97
CR9	1N457	20-102
CR10	1N457	20-26
CR11	1N457	20-38
CR12	1N457	20-79
CR13	1N457	20-88
CR14	1N457	20-90
CR15	1N457	20-30
CR16	1N647	20-78
CR17	1N647	20-70
CR18	1N647	20-65
CR19	1N647	20-69
CR20	1N647	20-66
CR21	1N647	20-68
CR22	1N647	20-71
CR23	1N647	20-55
CR24	1N647	20-67
CR25	1N647	20-74
CR26	1N647	20-73
CR27	1N755A	20-47
CR28	1N755A	20-75
CR29	1N457	20-87
CR30	1N647	20-46
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CR32	1N457	20-82
K1	3SAF1305	20-77
Q1	2N697	20-7
Q2	2N697	20-112

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Q3	2N697	20-18
Q4	2N697	20-100
Q5	2N697	20-81
Q6	2N697	20-89
Q7	2N697	20-45
Q8	2N657A	20-43
R1	224L1-103	20-54
R2	224L1-502	20-53
R3	224L1-103	20-52
R4	224L1-502	20-51
R5	224L1-501	20-50
R6	224L1-502	20-49
R7	224L1-503	20-2
R8	RC07GF332K	20-113
R9	RC07GF223K	20-118
R10	RC07GF333K	20-11
R11	RC07GF682K	20-116
R12	RC07GF223K	20-115
R13	RC07GF104K	20-15
R14	RC07GF562K	20-14
R15	RC07GF272K	20-105
R16	RN60B1002F	20-107
R17	RN60B2151F	20-109
R19	RC07GF103K	20-101
R20	RN60B2151F	20-20
R21	RN60B1332F	20-23
R22	RC07GF272K	20-22
R23	RC07GF681K	20-24
R24	RC07GF104K	20-25
R26	RC07GF103K	20-99
R27	RC07GF104K	20-37
R28	RC07GF562K	20-36
R29	RC07GF272K	20-34
R30	RN60B8251F	20-33
R31	RN60B2151F	20-31
R33	RC07GF103K	20-80
R34	RN60B2151F	20-96
R35	RN60B1212F	20-95
R36	RC07GF272K	20-92
R37	RC07GF681K	20-94
R38	RC07GF103K	20-86
R40	RC07GF104K	20-29
R41	RC07GF332K	20-10
R42	RN60B2371F	20-62
R43	RC07GF682K	20-9
R44	RN60B4220F	20-63
R45	RN60B4220F	20-64
R46	RN60B1103F	20-8
R47	RN60B2371F	20-59
R48	RN60B3831F	20-58
R49	RN60B1962F	20-3
R50	RN60B2151F	20-57
R51	RN60B2151F	20-56
R52	RN60B1962F	20-6
R53	RN60B3831F	20-60
R54	RN60B1103F	20-4
R55	RC07GF102K	20-61
R58	RC07GF122K	20-76
R59	RC07GF122K	20-48
R60	RC07GF102K	20-41
R61	RC07GF220K	20-42
R62	RC07GF221K	20-117
RT1	TITM1-4 1KPORM10PCT	20-5
RT2	TITM1-4 1KPORM10PCT	20-114

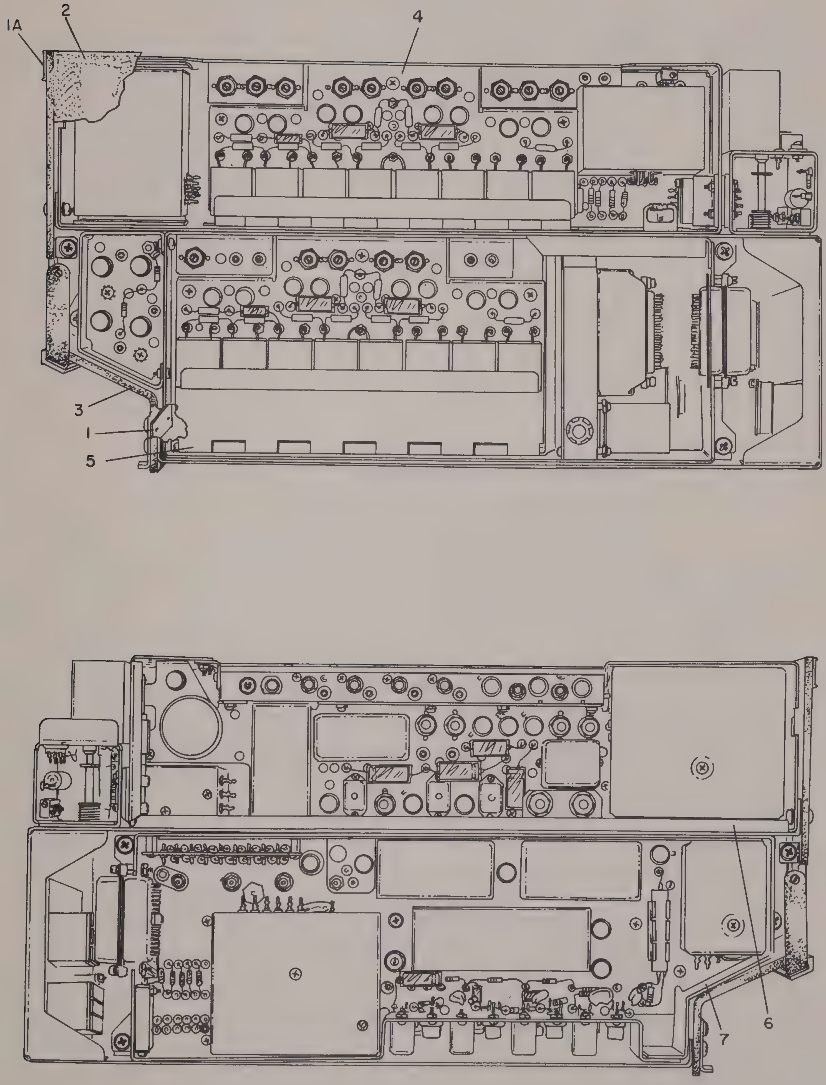
COMMERCIAL HARDWARE LIST

PART NUMBER	NOMENCLATURE	QTY.
201-1060-00	GROMMET, RUB. 9/32 ID, 9/16 OD, 1/4 THK	1
303-1021-00	WASHER, NONMETALLIC, ACETATE 9/64 ID, 1/2 OD, 0.015 THK	1
305-0008-00	RIVET, TUBULAR, AL, FH, 0.089 DIA X 5/32 LG SHK	2
305-0043-00	RIVET, TUBULAR, SIL PL BRS, FH, 0.060 DIA X 3/32 LG SHK	2
305-0045-00	RIVET, TUBULAR, SIL PL BRS, FH, 0.060 DIA X 1/8 LG SHK	1
305-1154-00	RIVET, SOLID, AL, UNIV HD, 0.093 DIA X 0.187 LG SHK	4
305-1351-00	RIVET, SOLID, AL, FH, 0.062 DIA X 1/8 LG SHK	7
305-1360-00	RIVET, SOLID, AL, FH, 3/32 DIA X 1/8 LG SHK	2
305-1361-00	RIVET, SOLID, AL, FH, 3/32 DIA X 3/16 LG SHK	27
305-1362-00	RIVET, SOLID, AL, FH, 3/32 DIA X 1/4 LG SHK	17
307-1047-00	EYELET, METALLIC, CAD. PL BRS, 0.345 DIA X 0.145 LG BARREL	1
307-1060-00	EYELET, METALLIC, CAD. PL BRS, 0.217 DIA X 0.093 LG BARREL	1
307-1216-00	EYELET, METALLIC, BRS, 0.121 DIA X 0.093 LG BARREL	3
307-1217-00	EYELET, METALLIC, BRS, 0.144 DIA X 0.094 LG BARREL	6
307-1218-00	EYELET, METALLIC, BRS, 0.170 DIA X 0.105 LG BARREL	1
310-0044-00	WASHER, FLAT, SST, 0.093 ID, 0.250 OD, 0.027 THK	8
310-0046-00	WASHER, FLAT, SST, 0.147 ID, 0.312 OD, 0.032 THK	6
310-0048-00	WASHER, FLAT, SST, 0.172 ID, 0.437 OD, 0.036 THK	2
310-0060-00	WASHER, FLAT, NI PL BRS, 0.203 ID, 0.500 OD, 0.038 THK	15
310-0071-00	WASHER, LOCK, SST, SR, 0.141 ID, 0.239 OD, 0.025 THK	2
310-0075-00	WASHER, LOCK, BRZ, SR, 0.088 ID, 0.165 OD, 0.015 THK	30
310-0081-00	WASHER, LOCK, BRZ, SR, 0.194 ID, 0.323 OD, 0.040 THK	4
310-0275-00	WASHER, LOCK, SST, SR, 0.088 ID, 0.175 OD, 0.020 THK	54
310-0278-00	WASHER, LOCK, SST, SR, 0.115 ID, 0.202 OD, 0.020 THK	4
310-0279-00	WASHER, LOCK, SST, 0.115 ID, 0.212 OD, 0.025 THK	14
310-0282-00	WASHER, LOCK, SST, SR, 0.141 ID 0.253 OD, 0.031 THK	9
310-0284-00	WASHER, LOCK, SST, SR, 0.194 ID, 0.337 OD, 0.047 THK	13
310-0396-00	WASHER, LOCK, BRZ, SR, 0.115 ID, 0.202 OD, 0.020 THK	20
310-6320-00	WASHER, FLAT, SST, 0.092 ID, 0.219 OD, 0.018 THK	3
312-0005-00	STUD, CONTINUOUS THD, SST, 4-40 X 1/4 LG	2
312-0007-00	STUD, CONTINUOUS THD, SST, 4-40 X 3/8 LG	2
313-0002-00	NUT, PLAIN, HEX., SST, 6-32 THD	2
313-0037-00	NUT, PLAIN, HEX., SST, 2-56 THD	20
313-0043-00	NUT, PLAIN, HEX., SST, 4-40 THD	20
313-0045-00	NUT, PLAIN, HEX., SST, 6-32 THD	6
313-0056-00	NUT, PLAIN, HEX., NI PL BRS, 10-32 THD	15
330-2284-00	SCREW, MACH., SST, FH, 2-56 X 3/16 LG	1
330-2285-00	SCREW, MACH., SST, FH, 2-56 X 1/4 LG	1
334-0271-00	NUT, PLAIN, HEX., NI PL BRS, 1/4-32 THD	5
334-0282-00	NUT, PLAIN, HEX., NI PL BRS, 1/4-32 THD	14
334-0287-00	NUT, PLAIN, HEX., SST, 1/4-32 THD	4
342-0041-00	SCREW, MACH., SST, FH, 2-56 X 5/8 LG	1
342-0043-00	SCREW, MACH., SST, FH, 4-40 X 3/16 LG	1
342-0044-00	SCREW, MACH., SST, FH, 4-40 X 1/4 LG	10
342-0046-00	SCREW, MACH., SST, FH, 4-40 X 3/8 LG	1
342-0050-00	SCREW, MACH., SST, FH, 4-40 X 3/4 LG	2
342-0131-00	SCREW, MACH., SST, FH, 2-56 X 1/8 LG	13
342-0132-00	SCREW, MACH., SST, FH, 2-56 X 3/16 LG	47
342-0133-00	SCREW, MACH., SST, FH, 2-56 X 1/4 LG	24
342-0135-00	SCREW, MACH., SST, FH, 2-56 X 3/8 LG	4
342-0137-00	SCREW, MACH., SST, FH, 2-56 X 1/2 LG	2
343-0035-00	SCREW, MACH., SST, PAN HD, 6-32 X 7/16 LG	8
343-0122-00	SCREW, MACH., SST, PAN HD, 2-56 X 1/8 LG	15
343-0123-00	SCREW, MACH., SST, PAN HD, 2-56 X 3/16 LG	22
343-0124-00	SCREW, MACH., SST, PAN HD, 2-56 X 1/4 LG	14

PART NUMBER	NOMENCLATURE	QTY.
343-0125-00	SCREW, MACH., PAN HD, 2-56 X 5/16 LG	2
343-0126-00	SCREW, MACH., SST, PAN HD, 2-56 X 3/8 LG	12
343-0127-00	SCREW, MACH., SST, PAN HD, 2-56 X 7/16 LG	2
343-0131-00	SCREW, MACH., SST, PAN HD, 4-40 X 1/8 LG	2
343-0132-00	SCREW, MACH., SST, PAN HD, 4-40 X 3/16 LG	43
343-0133-00	SCREW, MACH., SST, PAN HD, 4-40 X 1/4 LG	30
343-0134-00	SCREW, MACH., SST, PAN HD, 4-40 X 5/16 LG	6
343-0135-00	SCREW, MACH., SST, PAN HD, 4-40 X 3/8 LG	6
343-0136-00	SCREW, MACH., SST, PAN HD, 4-40 X 7/16 LG	1
343-0138-00	SCREW, MACH., SST, PAN HD, 4-40 X 5/8 LG	1
343-0143-00	SCREW, MACH., SST, PAN HD, 4-40 X 1-1/2 LG	2
343-0166-00	SCREW, MACH., SST, PAN HD, 6-32 X 3/16 LG	4
343-0167-00	SCREW, MACH., SST, PAN HD, 6-32 X 3/8 LG	6
343-0169-00	SCREW, MACH., SST, PAN HD, 6-32 X 3/8 LG	2
343-0170-00	SCREW, MACH., SST, PAN HD, 6-32 X 7/16 LG	2
343-0172-00	SCREW, MACH., SST, PAN HD, 6-32 X 9/16 LG	4
343-0297-00	SCREW, MACH., NI PL BRS, PAN HD, 2-56 X 1/8 LG	14
343-0298-00	SCREW, MACH., NI PL BRS, PAN HD, 2-56 X 3/16 LG	1
343-0393-00	SCREW, MACH., NI PL BRS, PAN HD, 3-48 X 9/16 LG	1
343-1898-00	SCREW, MACH., BRS, PAN HD, 4-40X 3/8 LG	2
343-2642-00	SCREW, MACH., SST, PAN HD, 4-40 X 13/16 LG	2
347-0005-00	SCREW, MACH., SST, FIL H, 4-40 X 3/16 LG	2
347-0022-00	SCREW, MACH., SST, FIL H, 2-56 X 1/4 LG	6
347-0024-00	SCREW, MACH., SST, FIL H, 2-56 X 3/8 LG	9
347-1268-00	SCREW, MACH., SST, FIL H, 2-56 X 1/8 LG	2
373-0006-00	WASHER, LOCK, SST, INT TEETH, 0.123 ID, 0.225 OD, 0.016 THK	8
373-0035-00	WASHER, LOCK, PH BRZ, INT TEETH, 0.267 ID, 0.408 OD, 0.018 THK	8
373-0090-00	WASHER, LOCK, SST INT TEETH, 0.267 ID, 0.408 OD, 0.018 THK	11
373-8010-00	WASHER, LOCK, SST, EXT TEETH, 0.123 ID, 0.260 OD, 0.016 THK	22
373-8020-00	WASHER, LOCK, SST, EXT TEETH, 0.150 ID, 0.317 OD, 0.020 THK	1
373-8500-00	WASHER, LOCK, SST, INT TEETH, 0.095 ID, 0.185 OD, 0.012 THK	1

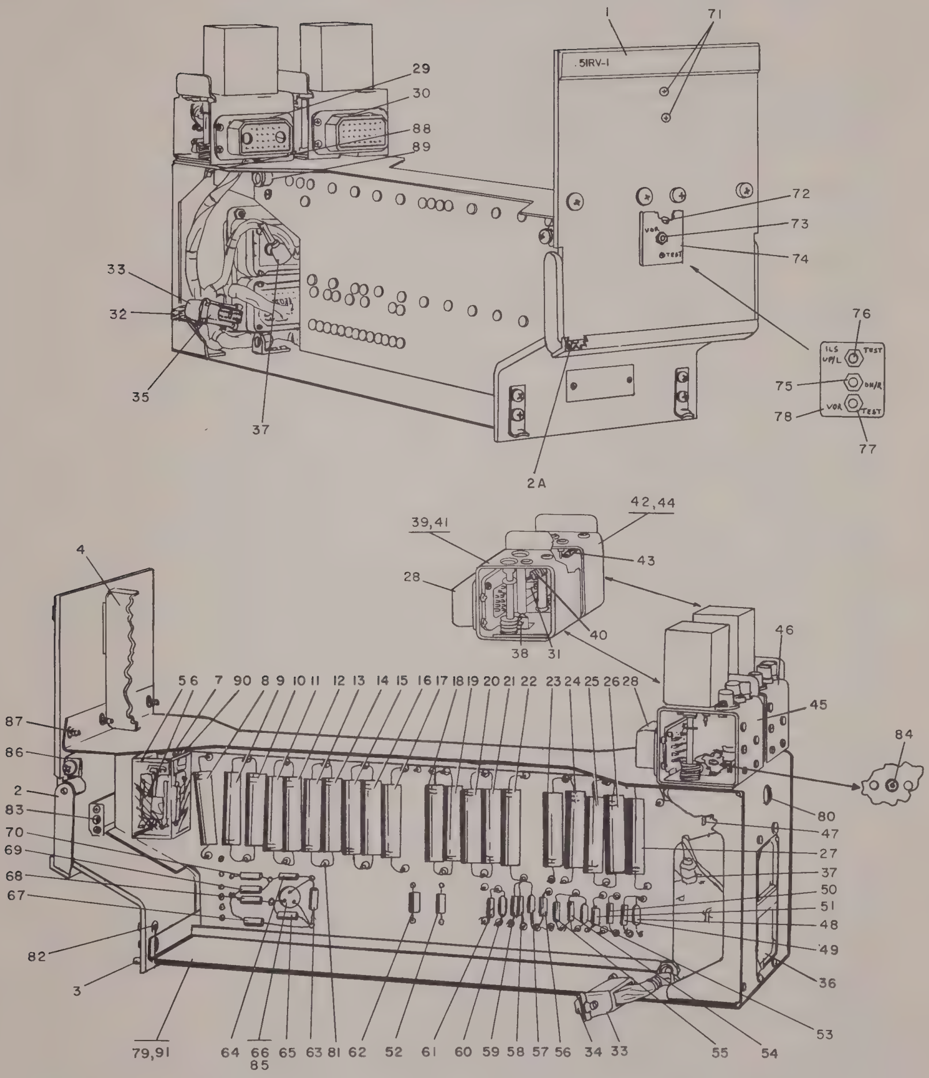
Section IV

Group Assembly Parts List



51RV-1 VOR/ILS Receiver,
Figure 1

FIG.-ITEM		PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
1	-	522-2450-00	51RV-1 VOR/ILS RECEIVER	A	1
1	-	522-2450-011	51RV-1 VOR/ILS RECEIVER	B	1
1	-	522-2450-012	51RV-1 VOR/ILS RECEIVER	C	1
1	-	522-2450-013	51RV-1 V/R/ILS RECEIVER	D	1
1	-	522-2450-014	51RV-1 VOR/ILS RECEIVER EFF MCN 270	G	1
1	-	522-2450-015	51RV-1 VOR/ILS RECEIVER EFF MCN 270	H	1
1	-	522-2450-016	51RV-1 VOR/ILS RECEIVER EFF MCN 270	J	1
1	-	522-2450-018	51RV-1 VOR/ILS RECEIVER EFF MCN 270	K	1
-	1	553-9776-003	. PLATE, IDENT		1
			ATTACHING PARTS		
		COML	. SCREW, MACH. 347-1268-00		2
			- - * - -		
-	1A	549-3519-002	. STRIP, IDENT EFF MCN 270		1
-	2	553-6249-004	. COVER, ELECTRICAL EQUIP.		1
			ATTACHING PARTS		
		330-3677-00	. SCREW, ASSEMBLED WASH.		2
		MS35216-25	. SCREW, MACH. V77250 343-0169-00		1
		545-7533-003	. WASHER		1
		548-3954-002	. INSULATOR		1
			- - * - -		
-	3	553-6533-005	. NAVIGATION SET SUBASSEMBLY SEE FIG. 2 EFF THRU MCN 269	A,B	1
-	3	553-6534-015	. NAVIGATION SET SUBASSEMBLY SEE FIG. 2 EFF MCN 270	A,B	1
-	3	553-6534-005	. NAVIGATION SET SUBASSEMBLY SEE FIG. 2	C,D	1
-	3	756-3838-015	. NAVIGATION SET SUBASSEMBLY SEE FIG. 2	G,H	1
-	3	756-3838-005	. NAVIGATION SET SUBASSEMBLY SEE FIG. 2	J,K	1
-	4	522-2494-00	. 344A-2 VOR/LOC INSTRUMENTATION UNIT SEE FIG. 4		1
			ATTACHING PARTS		
		COML	. SCREW, MACH. 343-0035-00		2
		340-0641-00	. SLEEVE, SPG		2
			- - * - -		
-	5	522-3197-011	. 344F-1 AUTOMATIC VOR AIR NAVIGATION INSTRUMENTATION UNIT W/O RMI SEE FIG. 6	A,D G,K	1
-	5	522-3197-00	. 344F-1 AUTOMATIC VOR AIR NAVIGATION INSTRUMENTATION UNIT W/ RMI SEE FIG. 6	B,C H,J	1
-	6	522-3195-00	. 51V-4B GLIDE SLOPE RADIO RECEIVER SEE FIG. 9		1
			ATTACHING PARTS		
		COML	. SCREW, MACH. 343-0035-00		2
		340-0641-00	. SLEEVE, SPG		2
			- - * - -		
-	7	522-3196-005	. 51X-4 VOR RADIO RECEIVER SEE FIG. 13		1
2	-	553-6533-005	NAVIGATION SET SUBASSEMBLY SEE FIG. 1-3 FOR NHA	A,B	REF
2	-	553-6534-015	NAVIGATION SET SUBASSEMBLY SEE FIG. 1-3 FOR NHA	A,B	REF
2	-	553-6534-005	NAVIGATION SET SUBASSEMBLY SEE FIG. 1-3 FOR NHA	C,D	REF
2	-	756-3838-015	NAVIGATION SET SUBASSEMBLY SEE FIG. 1-3 FOR NHA	G,H	REF
2	-	756-3838-005	NAVIGATION SET SUBASSEMBLY SEE FIG. 1-3 FOR NHA	J,K	REF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Navigation Set Subassembly
Figure 2

	FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
	2 - 1	549-3519-002	. STRIP, IDENT EFF THRU MCN 269 ONLY	A,B C,D	1
R	- 2	549-3936-004	. STRAP, HANDLE EFF THRU MCN 835		1
R	- 2	554-3948-003	. HANDLE ASSY EFF MCN 836		1
			ATTACHING PARTS		
R		549-3905-002	. PIN, STRAIGHT, HDLS EFF THRU MCN 835		2
R		549-3906-002	. SPRING, HELICAL, TORSION EFF THRU MCN 835		1
R		549-3907-002	. SPRING, HELICAL, TORSION EFF THRU MCN 835		1
R		MS16632-1012	. RING, RETAINING V89462 340-0112-00 EFF MCN 299		2
R		F22NM107-62	. NUT, SELF-LKG, HEX. V72962 333-1069-00 EFF MCN 836		2
R		761-5190-001	. PIN, HINGE EFF MCN 836		2
R		302-0638-020	. WASHER, NONMETALLIC EFF MCN 836		4
			- - * - -		
R	- 2A	761-5187-001	. BUMPER, RUB. EFF MCN 836		2
			- - * - -		
	- 3	503-4970-001	. BRACKET, ANGLE		2
			ATTACHING PARTS		
		MS35216-22	. SCREW, MACH. V77250 343-0166-00		4
			- - * - -		
	- 4	756-3816-005	. INSTRUMENT LANDING SYSTEM TEST SUBASSEMBLY SEE FIG. 20	G,H J,K	1
			ATTACHING PARTS		
		COML	. SCREW, MACH. 343-0035-00		2
		MS35216-25	. SCREW, MACH. V77250 343-0169-00		1
			- - * - -		
	- 5	553-6488-003P	. COVER, RELAY EFF THRU MCN 514 ONLY		1
	- 6	28010-2	. RELAY, ARM. V77523 972-1335-00 K1 EFF THRU MCN 514	A,B C,D	1
	- 6	3SAH-1173-A2	. RELAY, ARM. V01526 974-0950-00 K1 EFF MCN 515	A,B C,D	1
R	- 6	3SAH-1173-A2	. RELAY, ARM. V01526 974-0950-00 K1	G,H J,K	1
	- 7	553-6456-002	. BRACKET, RELAY		1
			ATTACHING PARTS FOR 6 AND 7		
		MS20365D440A	. NUT, SELF-LKG, HEX. V72962 333-0347-00		2
		MS35216-10	. SCREW, MACH. V77250 343-0131-00		2
		MS35216-12	. SCREW, MACH. V77250 343-0133-00		2
			- - * - -		
	- 8	S13022	. CAPACITOR, FXD, 250 UF 20%, 3 V V56289 183-2277-00 C6 EFF THRU MCN 387	A,B C,D	1
	- 8	183-2324-00	. CAPACITOR, FXD, 220 UF 20%, 6 V C6 EFF MCN 388	A,B C,D	1
	- 8	S13022	. CAPACITOR, FXD, 250 UF 20%, 3 V V56289 183-2277-00 C6 EFF THRU MCN 166	G,H J,K	1
	- 8	183-2324-00	. CAPACITOR, FXD, 220 UF 20%, 6 V C6 EFF MCN 167	G,H J,K	1
	- 9	S13022	. CAPACITOR, FXD, 250 UF 20%, 3 V V56289 183-2277-00 C7 EFF THRU MCN 387	A,B C,D	1
R	- 9	183-2324-00	. CAPACITOR, FXD, 220 UF 20%, 6 V C7 EFF MCN 388	A,B C,D	1
	- 9	S13022	. CAPACITOR, FXD, 250 UF 20%, 3 V V56289 183-2277-00 C7 EFF THRU MCN 166	G,H J,K	1
	- 9	183-2324-00	. CAPACITOR, FXD, 220 UF 20%, 6 V C7 EFF MCN 167	G,H J,K	1
	- 10	S13022	. CAPACITOR, FXD, 250 UF 20%, 3 V V56289 183-2277-00 C8 EFF THRU MCN 387	A,B C,D	1

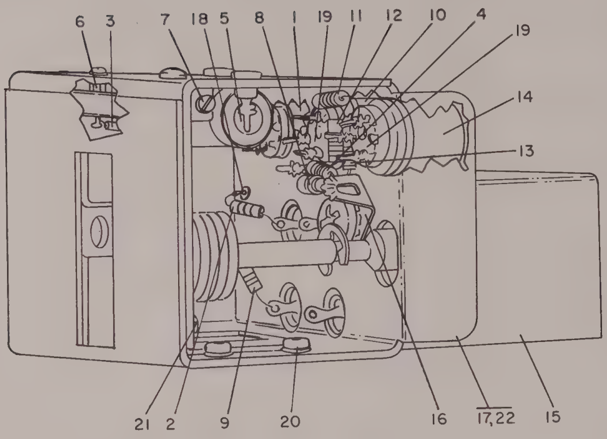
FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
2 - 10	183-2324-00	• CAPACITOR, FXD, 220 UF 20%, 6 V C8 EFF MCN 388	A,B C,D	1
- 10	S13022	• CAPACITOR, FXD, 250 UF 20%, 3 V V56289 183-2277-00 C8 EFF THRU MCN 166	G,H J,K	1
- 10	183-2324-00	• CAPACITOR, FXD, 220 UF 20%, 6 V C8 EFF MCN 167	G,H J,K	1
- 11	S13022	• CAPACITOR, FXD, 250 UF 20%, 3 V V56289 183-2277-00 C9 EFF THRU MCN 387	A,B C,D	1
- 11	183-2324-00	• CAPACITOR, FXD, 220 UF 20%, 6 V C9 EFF MCN 388	A,B C,D	1
- 11	S13022	• CAPACITOR, FXD, 250 UF 20%, 3 V V56289 183-2277-00 C9 EFF THRU MCN 166	G,H J,K	1
- 11	183-2324-00	• CAPACITOR, FXD, 220 UF 20%, 6 V C9 EFF MCN 167	G,H J,K	1
- 12	S13022	• CAPACITOR, FXD, 250 UF 20%, 3 V V56289 183-2277-00 C10 EFF THRU MCN 387	A,B C,D	1
- 12	183-2324-00	• CAPACITOR, FXD, 220 UF 20%, 6 V C10 EFF MCN 388	A,B C,D	1
- 12	S13022	• CAPACITOR, FXD, 250 UF 20%, 3 V V56289 183-2277-00 C10 EFF THRU MCN 166	G,H J,K	1
- 12	183-2324-00	• CAPACITOR, FXD, 220 UF 20%, 6 V C10 EFF MCN 167	G,H J,K	1
- 13	S13022	• CAPACITOR, FXD, 250 UF 20%, 3 V V56289 183-2277-00 C11 EFF THRU MCN 387	A,B C,D	1
- 13	183-2324-00	• CAPACITOR, FXD, 220 UF 20%, 6 V C11 EFF MCN 388	A,B C,D	1
- 13	S13022	• CAPACITOR, FXD, 250 UF 20%, 3 V V56289 183-2277-00 C11 EFF THRU MCN 166	G,H J,K	1
- 13	183-2324-00	• CAPACITOR, FXD, 220 UF 20%, 6 V C11 EFF MCN 167	G,H J,K	1
- 14	S13022	• CAPACITOR, FXD, 250 UF 20%, 3 V V56289 183-2277-00 C12 EFF THRU MCN 387	A,B C,D	1
- 14	183-2324-00	• CAPACITOR, FXD, 220 UF 20%, 6 V C12 EFF MCN 388	A,B C,D	1
- 14	S13022	• CAPACITOR, FXD, 250 UF 20%, 3 V V56289 183-2277-00 C12 EFF THRU MCN 166	G,H J,K	1
- 14	183-2324-00	• CAPACITOR, FXD, 220 UF 20%, 6 V C12 EFF MCN 167	G,H J,K	1
- 15	S13022	• CAPACITOR, FXD, 250 UF 20%, 3 V V56289 183-2277-00 C13 EFF THRU MCN 387	A,B C,D	1
- 15	183-2324-00	• CAPACITOR, FXD, 220 UF 20%, 6 V C13 EFF MCN 388	A,B C,D	1
- 15	S13022	• CAPACITOR, FXD, 250 1UF 20%, 3 V V56289 183-2277-00 C13 EFF THRU MCN 166	G,H J,K	1
- 15	183-2324-00	• CAPACITOR, FXD, 220 UF 20%, 6 V C13 EFF MCN 167	G,H J,K	1
- 16	S13022	• CAPACITOR, FXD, 250 UF 20%, 3 V V56289 183-2277-00 C14 EFF THRU MCN 387	A,B C,D	1
- 16	183-2324-00	• CAPACITOR, FXD, 220 UF 20%, 6 V C14 EFF MCN 388	A,B C,D	1
- 16	S13022	• CAPACITOR, FXD, 250 UF 20%, 3 V V56289 183-2277-00 C14 EFF THRU MCN 166	G,H J,K	1
- 16	183-2324-00	• CAPACITOR, FXD, 220 UF 20%, 6 V C14 EFF MCN 167	G,H J,K	1
- 17	S13022	• CAPACITOR, FXD, 250 UF 20%, 3 V V56289 183-2277-00 C15 EFF THRU MCN 387	A,B C,D	1
- 17	183-2324-00	• CAPACITOR, FXD, 220 UF 20%, 6 V C15 EFF MCN 388	A,B C,D	1
- 17	S13022	• CAPACITOR, FXD, 250 UF 20%, 3 V V56289 183-2277-00 C15 EFF THRU MCN 166	G,H J,K	1

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
2 - 17	183-2324-00	• CAPACITOR, FXD, 220 UF 20%, 6 V C15 EFF MCN 167	G,H J,K	1
- 18	S13022	• CAPACITOR, FXD, 250 UF 20%, 3 V V56289 183-2277-00 C1		1
- 19	S13022	• CAPACITOR, FXD, 250 UF 20%, 3 V V56289 183-2277-00 C2		1
- 20	S13022	• CAPACITOR, FXD, 250 UF 20%, 3 V V56289 183-2277-00 C3		1
- 21	S13022	• CAPACITOR, FXD, 250 UF 20%, 3 V V56289 183-2277-00 C4		1
- 22	S13022	• CAPACITOR, FXD, 250 UF 20%, 3 V V56289 183-2277-00 C5		1
- 23	S13022	• CAPACITOR, FXD, 250 UF 20%, 3 V V56289 183-2277-00 C16		1
- 24	S13022	• CAPACITOR, FXD, 250 UF 20%, 3 V V56289 183-2277-00 C17		1
- 25	S13022	• CAPACITOR, FXD, 250 UF 20%, 3 V V56289 183-2277-00 C18		1
- 26	S13022	• CAPACITOR, FXD, 250 UF 20%, 3 V V56289 183-2277-00 C19		1
- 27	S13022	• CAPACITOR, FXD, 250 UF 20%, 3 V V56289 183-2277-00 C20		1
- 28	553-6452-00	• WIRING HARNESS, BRANCHED	A,B G,H	1
- 28	553-9304-00	• WIRING HARNESS, BRANCHED	C,D J,K	1
- 29	DPA24W2-33S1	• • CONNECTOR, RECP V91146 370-2178-00 J5		1
- 30	DPA32-33SA 101	• • CONNECTOR, RECP V71468 370-2072-00 J2		1
		ATTACHING PARTS FOR 29 AND 30		
	MS35200-3	• • SCREW, MACH. V77250 342-0133-00		8
		- - * - -		
- 31	DPA50048-1	• • CONNECTOR INSERT, COAX. V91146 370-2184-00		1
- 32	DM53742-5000	• • CONNECTOR INSERT, COAX V71468 371-2472-00		1
- 33	DB19678-11	• • SHELL, ELECTRICAL CONN V71468 371-0304-00		2
- 34	DB25SC7	• • CONNECTOR, RECP V71468 371-0221-00 J1		1
- 35	DBM21W1S	• • CONNECTOR, RECP V71468 371-0945-00 J4		1
		ATTACHING PARTS FOR 34 AND 35		
	20419	• • SCREW LOCK ASSY V71468 371-0040-00		4
		- - * - -		
- 36	DPX2CA32W2P 57P34B0202	• • CONNECTOR, RECP V71468 370-5233-00 P3		1
		ATTACHING PARTS		
	MS20365D440A	• • NUT, SELF-LKG, HEX. V72962 333-0347-00		4
	MS35216-14	• • SCREW, MACH. V77250 343-0135-00		4
		- - * - -		
- 37	249-1386-00	• • CONNECTOR INSERT, COAX. V71468 370-5222-00		2
- 38	541-5179-002	• • BUTTON, CABLE		2
		ATTACHING PARTS		
	MS35216-14	• • SCREW, MACH. V77250 343-0135-00		2
	MS35337-78	• • WASHER, LOCK V79807 310-0278-00		2
		- - * - -		
- 39	553-9307-003	• CHASSIS, ELECTRONIC EQUIP.	C,D J,K	1
- 40	RN60B1001F	• • RESISTOR, FXD, 1000 OHMS 1%, 1/8 W V75042 705-6596-00 R138		1

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
2 - 41	553-9305-002	. . CHASSIS, ELECTRONIC EQUIP.		1
- 42	553-9308-003	. CHASSIS, ELECTRONIC EQUIP.	C,D J,K	1
- 43	RN60B1001F	. . RESISTOR, FXD, 1000 OHMS 1%, 1/8 W V75042 705-6596-00 R139		1
- 44	553-9306-002	. . CHASSIS, ELECTRICAL EQUIP.		1
- 45	553-6518-004	. ELECTRONIC CONTROL AMPLIFIER SEE FIG. 3	A,B G,H	1
- 46	553-6517-004	. ELECTRONIC CONTROL AMPLIFIER SEE FIG. 3	A,B G,H	1
		ATTACHING PARTS FOR 39, 42, 45 AND 46		
	546-8186-003	. SCREW, ASSEMBLED WASH.		4
	COML	. WASHER, FLAT 310-0048-00		2
	5144-15MD	. RING, RETAINING V79136 340-0915-00		4
	553-6474-002	. SPRING, HELICAL, COMPRESSION		2
	553-6475-002	. CUP, SCR RETRACTING		2
		- - * - -		
- 47	547-5305-002	. LUG, SOLDER		1
		ATTACHING PARTS		
	MS20365D440A	. NUT, SELF-LKG, HEX. V72962 333-0347-00		1
	MS35216-12	. SCREW, MACH. V77250 343-0133-00		1
		- - * - -		
- 48	RN60B1001F	. RESISTOR, FXD, 1000 OHMS 1%, 1/8 W V75042 705-6596-00 R3		1
- 49	CF1-8 500-1PCT	. RESISTOR, FXD, 500 OHMS 1%, 1/8 W V19701 705-0267-00 R2		1
- 50	CF1-8 200-1PCT	. RESISTOR, FXD, 200 OHMS 1%, 1/8 W V19701 705-0265-00 R1		1
- 51	1N3255	. SEMICONDUCTOR DEVICE, DIO V49671 353-3276-00 CR1		1
- 52	1N3255	. SEMICONDUCTOR DEVICE, DIO V49671 353-3276-00 CR2		1
- 53	RN60B1001F	. RESISTOR, FXD, 1000 OHMS 1%, 1/8 W V75042 705-6596-00 R8		1
- 54	CF1-8 500-1PCT	. RESISTOR, FXD, 500 OHMS 1%, 1/8 W V19701 705-0267-00 R9		1
- 55	CF1-8 250-1PCT	. RESISTOR, FXD, 250 OHMS 1%, 1/8 W V19701 705-0266-00 R10		1
- 56	RW69V681	. RESISTOR, FXD, 680 OHMS 5%, 3 W V91637 747-5394-00 R7 EFF THRU MCN 387		1
- 56	RC32GF471J	. RESISTOR, FXD, 470 OHMS 5%, 1 W V01121 745-3337-00 R7 EFF MCN 388		1
- 57	RN60B1001F	. RESISTOR, FXD, 1000 OHMS 1%, 1/8 W V75042 705-6596-00 R4		1
- 58	CF1-8 500-1PCT	. RESISTOR, FXD, 500 OHMS 1%, 1/8 W V19701 705-0267-00 R5		1
- 59	CF1-8 250-1PCT	. RESISTOR, FXD, 250 OHMS 1%, 1/8 W V19701 705-0266-00 R6		1
- 60	RN60B1001F	. RESISTOR, FXD, 1000 OHMS 1%, 1/8 W V75042 705-6596-00 R11		1
- 61	CF1-8 500-1PCT	. RESISTOR, FXD, 500 OHMS 1%, 1/8 W V19701 705-0267-00 R12		1
- 62	RC20GF102K	. RESISTOR, FXD, 1000 OHMS 10%, 1/2 W V53021 745-1352-00 R14		1
R - 63	RC07GF272K	. RESISTOR, FXD, 2700 OHMS 10%, 1/4 W V01121 745-0764-00 R32 EFF MCN 270 FSB NO. 4		1
R - 64	1N647	. SEMICONDUCTOR DEVICE, DIO V03877 353-2596-00 CR8 EFF MCN 270 FSB NO. 4		1

	FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
R	2 - 65	RC07GF562K	. RESISTOR, FXD, 5600 OHMS 10%, 1/4 W V01121 745-0776-00 R31 EFF MCN 270 FSB NO. 4		1
R	- 66	2N887	. TRANSISTOR V08732 353-3370-00 Q4 EFF MCN 270 FSB NO. 4		1
R	- 67	K150J15S	. CAPACITOR, FXD, 150 UF 20%, 15 VDCW V05397 184-7656-00 C25 EFF MCN 270 FSB NO. 4		1
R	- 68	1N758A	. SEMICONDUCTOR DEVICE, DIO V03877 353-2724-00 CR9 EFF MCN 270 FSB NO. 4		1
R	- 69	RC07GF150K	. RESISTOR, FXD, 15 OHMS 10%, 1/4 W V01121 745-0683-00 R30 EFF MCN 270 FSB NO. 4		1
	- 70	RN60B1472F	. RESISTOR, FXD, 14,700 OHMS 1%, 1/8 W V75042 7C5-6652-00 R29 EFF MCN 270 THRU 453		1
R	- 70	RN60B1962F	. RESISTOR, FXD, 19,600 OHMS 1%, 1/8 W V75042 705-6658-00 R29 EFF MCN 454 FSB NO. 4		1
	- 71	COML	. SCREW, MACH. 343-0035-00 EFF MCN 270	A,B C,D	2
			ATTACHING PARTS		
		COML	. NUT, PLAIN, HEX. 313-0045-00		2
		MS35338-79	. WASHER, LOCK V79807 310-0282-00		2
			- - * - -		
R	- 72	BS48151BLK NIPLOROX	. BUTTON, PLUG V83058 308-0057-00 EFF MCN 270 THRU 514	A,B	2
R	- 73	30-1	. SWITCH, PUSH V81073 260-2709-00 S3 EFF MCN 515 FSB NO. 5	A,B C,D	1
			ATTACHING PARTS		
		COML	. NUT, PLAIN, HEX. 334-0287-00		1
			- - * - -		
R	- 74	756-9908-002	. PLATE, INSTRUCTION EFF MCN 515 FSB NO. 5	A,B C,D	1
			ATTACHING PARTS		
		MS20365D440A	. NUT, SELF-LKG, HEX. V72962 333-0347-00		2
		302-0007-00	. WASHER, SHOULDERED		2
		MS35214-14	. SCREW, MACH. V77250 343-1898-00		2
R	- 75	30-1	. SWITCH, PUSH V81073 260-2709-00 S1 EFF MCN 161 FSB NO. 5	G,H J,K	1
R	- 76	30-1	. SWITCH, PUSH V81073 260-2709-00 S2 EFF MCN 161 FSB NO. 5	G,H J,K	1
R	- 77	30-1	. SWITCH, PUSH V81073 260-2709-00 S3 EFF MCN 161 FSB NO. 5	G,H J,K	1
R	- 78	756-9909-002	. PLATE, INSTRUCTION EFF MCN 161 FSB NO. 5	G,H J,K	1
			ATTACHING PARTS FOR 75 THRU 78		
		COML	. NUT, PLAIN, HEX. 334-0287-00		3
			- - * - -		
	- 79	553-6530-005	. CHASSIS, ELECTRICAL EQUIP.		1
	- 80	K3000-06	. . NUT, SELF-LKG, PLATE V75237 334-1974-00		1
			ATTACHING PARTS		
		MS20426AD3-3	. . RIVET, SOLID V12014 305-1361-00		2
			- - * - -		
	- 81	G2621	. . TERMINAL, STUD V12615 306-1100-00		54
R	- 81	G2621	. . TERMINAL, STUD V12615 306-1100-00 EFF MCN 270 FSB NO. 4		12

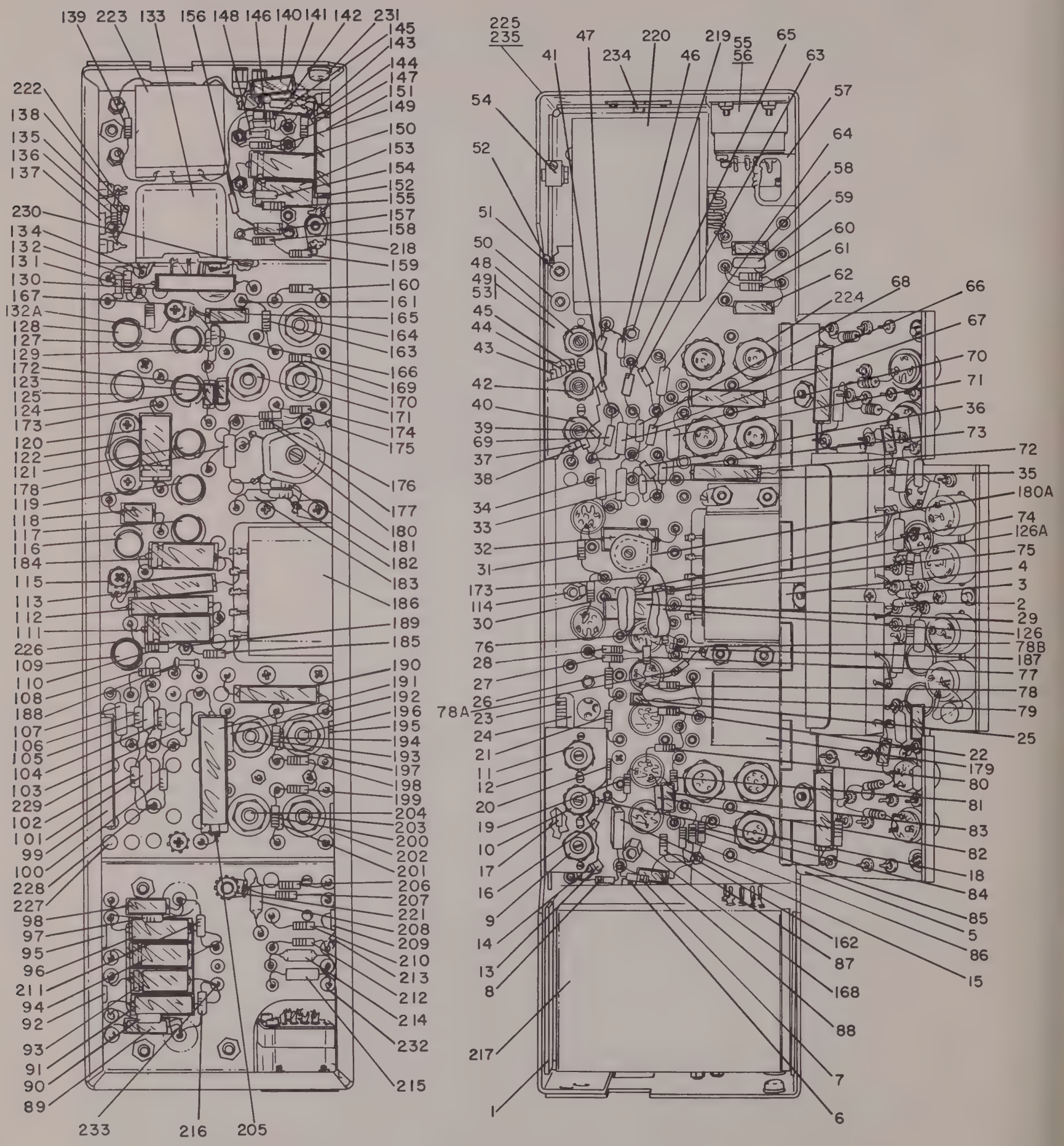
FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
2 - 81	G2621	• • TERMINAL, STUD V12615 306-1100-00 EFF MCN 270		12
- 82	5116	• • NUT, CAPTIVE V85301 334-0428-00		4
- 83	K1913-06	• • NUT, SELF-LKG, PLATE V75237 334-1033-00		2
		ATTACHING PARTS		
	MS20426AD3-3	• • RIVET, SOLID V12014 305-1361-00 EFF THRU MCN 134		4
	MS20470AD3-3	• • RIVET, SOLID V12014 305-1154-00 EFF MCN 135		4
		- - * - -		
- 84	K1913-06	• • NUT, SELF-LKG, PLATE V75237 334-1033-00 EFF MCN 270		1
		ATTACHING PARTS		
	MS20426AD3-4	• • RIVET, SOLID V12014 305-1362-00		2
		- - * - -		
R - 85	352-9939-00	• • HOLDER, TSTR EFF MCN 270 FSB NO. 4		1
- 86	F12NCFMA2-62	• • NUT, SELF-LKG, CLINCH V72962 333-0842-00		2
- 87	553-6457-002	• • SLEEVE, BUSH.		4
- 88	K1913-08	• • NUT, SELF-LKG, PLATE V75237 334-1034-00		4
		ATTACHING PARTS		
	MS20426AD3-3	• • RIVET, SOLID V12014 305-1361-00		4
	MS20426AD3-3	• • RIVET, SOLID V12014 305-1361-00 EFF THRU MCN 269		4
	MS20426AD3-4	• • RIVET, SOLID V12014 305-1362-00 EFF MCN 270		4
		- - * - -		
- 89	68NA7-68-62	• • NUT, PLAIN, PLATE V72962 333-5620-00		4
		ATTACHING PARTS		
	MS20426AD3-3	• • RIVET, SOLID V12014 305-1361-00 EFF THRU MCN 269		8
	MS20426AD3-4	• • RIVET, SOLID V12014 305-1362-00 EFF MCN 270		8
		- - * - -		
- 90	F22NCFMA1-40	• • NUT, SELF-LKG, CLINCH V72962 333-0839-00		2
- 91	553-6529-005	• • CHASSIS, ELECTRICAL EQUIP.		1



Electronic Control Amplifier
Figure 3

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
3 -	553-6518-004	ELECTRONIC CONTROL AMPLIFIER SEE FIG. 2-45 FOR NHA	E	REF
3 -	553-6517-004	ELECTRONIC CONTROL AMPLIFIER SEE FIG. 2-46 FOR NHA	F	REF
- 1	2N2201	. TRANSISTOR V03508 352-0428-00 Q3 OR Q7		1
		ATTACHING PARTS		
	MS35649-24	. NUT, PLAIN, HEX. V77250 313-0037-00		2
	COML	. NUT, PLAIN, HEX. 313-0002-00		2
	MS35216-3	. SCREW, MACH. V77250 343-0124-00		2
		- - * - -		
- 2	RC07GF331K	. RESISTOR, FXD, 330 OHMS 10%, 1/4 W V01121 745-0731-00 R20 OR R27		1
R - 3	RC07GF102K	. RESISTOR, FXD, 1000 OHMS 10%, 1/4 W V01121 745-0749-00 R21 OR R28 EFF THRU MCN 283		1
R - 3	RC07GF103K	. RESISTOR, FXD, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 R21 OR R28 EFF MCN 284		1
- 3	RC07GF102K	. RESISTOR, FXD, 1000 OHMS 10%, 1/4 W V01121 745-0749 R21 OR R28		1
- 4	RC07GF103K	. RESISTOR, FXD, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 R18 OR R23		1

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
3 - 5	K100J20S	. CAPACITOR, FXD, 100 UF 20%, 20 VDCW V05397 184-7412-00 C22 OR C24		1
- 6	AB396-1	. TERMINAL, STUD V12615 306-1281-00		1
		ATTACHING PARTS		
	COML	. SCREW, MACH. 343-0298-00		1
	COML	. WASHER, LOCK 310-0075-00		1
		- - * - -		
- 7	224L1-502	. RESISTOR, VAR, 5000 OHMS 5%, 1/2 W V80294 381-1287-00 R17 OR R26		1
		ATTACHING PARTS		
	68-1660-26	. NUT, SELF-LKG, HEX. V72962 333-0604-00		2
	MS35216-6	. SCREW, MACH. V77250 343-0127-00		2
		- - * - -		
- 8	PS6467	. SEMICONDUCTOR DEVICE, DIO V01281 353-2893-00 CR3 OR CR7		1
- 9	1N270	. SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR4 OR CR6		1
- 10	2N328A	. TRANSISTOR V96214 352-0073-00 Q2 OR Q6		1
- 11	RC07GF473K	. RESISTOR, FXD, 47,000 OHMS 10%, 1/4 W V01121 745-0809-00 R15 OR R24		1
- 12	RC07GF103K	. RESISTOR, FXD, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 R16 OR R22		1
- 13	RC07GF103K	. RESISTOR, FXD, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 R19 OR R25		1
- 14	2N697	. TRANSISTOR V96214 352-0197-00 Q1 OR Q5		1
- 15	92-0131-00	. SATURABLE REACTOR V88063 674-5014-00 T1 OR T2		1
- 16	2104-06-02-2520N	. TERMINAL, LUG V78189 304-0318-00		1
		ATTACHING PARTS FOR 15 AND 16		
	MS35216-23	. SCREW, MACH. V77250 343-0167-00		2
	MS35337-79	. WASHER, LOCK V79807 310-0071-00		2
		- - * - -		
- 17	553-6493-003P	. CHASSIS, ELECTRONIC EQUIP.	E	1
- 17	553-6494-003P	. CHASSIS, ELECTRONIC EQUIP.	F	1
- 18	G2621	. . TERMINAL, STUD V12615 306-1100-00		4
- 19	3307X	. . SOCKET, TSTR V91662 352-9903-00 XQ2 OR XQ6		1
- 20	3307X	. . SOCKET, TSTR V91662 352-9903-00 XQ1 OR XQ5		1
		ATTACHING PARTS FOR 19 AND 20		
	757	. . RETAINER, TSTR SOC V91662 352-9904-00		2
		- - * - -		
- 21	F22NCFMA1-26	. . NUT, SELF-LKG, CLINCH V72962 333-0837-00		4
- 22	553-6491-003P	. . CHASSIS, ELECTRONIC EQUIP.	E	1
- 22	553-6492-003P	. . CHASSIS, ELECTRONIC EQUIP.	F	1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344A-2 VOR/LOC Instrumentation Unit
Figure 4

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
4 -	522-2494-00	344A-2 VOR/LOC INSTRUMENTATION UNIT SEE FIG. 1-4 FOR NHA		REF
- 1	549-6608-00	. INSTRUMENTATION UNIT, AIR NAVIGATION, MANUAL VOR/LCL		1
- 2	1N457	. . SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR40		1
- 3	1N457	. . SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR34		1
- 4	1065CADPL	. . STRAP, RETAINING V71785 139-0406-00		1
		ATTACHING PARTS		
	MS35649-44	. . NUT, PLAIN, HEX. V77250 313-0043-00		1
	MS35338-78	. . WASHER, LOCK V79807 310-0279-00		1
		- - * - -		
- 5	549-6605-00	. . AMPLIFIER ASSY SEE FIG. 5		1
		ATTACHING PARTS		
	MS35649-44	. . NUT, PLAIN, HEX. V77250 313-0043-00		2
	MS35338-78	. . WASHER, LOCK V79807 310-0279-00		2
		- - * - -		
- 6	RC07GF392K	. . RESISTOR, FXD, 3900 OHMS 10%, 1/4 W V01121 745-0770-00 R46		1
- 7	RC07GF221K	. . RESISTOR, FXD, 220 OHMS 10%, 1/4 W V01121 745-0725-00 R48 EFF THRU MCN 407		1
- 7	RC07GF331K	. . RESISTOR, FXD, 330 OHMS 10%, 1/4 W V01121 745-0731-00 R48 EFF MCN 408 FSB NO. 1		1
- 8	RC07GF333K	. . RESISTOR, FXD, 33,000 OHMS 10%, 1/4 W V01121 745-0803-00 R2		1
- 9	BJ24238	. . RESISTOR, VAR, 10,000 OHMS 20%, 1/2 W V71450 380-1657-00 R42		1
- 10	BJ24243	. . RESISTOR, VAR, 100 OHMS 20%, 1/2 W V71450 380-1662-00 R52		1
- 11	BJ24246	. . RESISTOR, VAR, 2500 OHMS 20%, 1/2 W V71450 380-1665-00 R53		1
		ATTACHING PARTS FOR 9 THRU 11		
	COML	. . NUT, PLAIN, HEX. 334-0282-00		3
	1714-05-00-4102	. . WASHER, LOCK V78189 373-0090-00		3
		- - * - -		
- 12	549-6613-003	. . BRACKET, ANGLE		1
		ATTACHING PARTS		
	MS35206-2	. . SCREW, MACH. V77250 342-0132-00		2
		- - * - -		
- 13	RC07GF102K	. . RESISTOR, FXD, 1000 OHMS 10%, 1/4 W V01121 745-0749-00 R31		1
- 14	1N755A	. . SEMICONDUCTOR DEVICE, DIO V03877 353-2718-00 CR9		1
- 15	22R3T51EG	. . CAPACITOR, FXD, 510 UUF 2%, 300 VDCW V14655 912-0544-00 C2		1
- 16	RC07GF122K	. . RESISTOR, FXD, 1200 OHMS 10%, 1/4 W V01121 745-0752-00 R28		1
R - 17	CK62AW472M	. . CAPACITOR, FXD, 4700 UUF 20%, 500 VDCW V01939 913-1187-00 C54		1
- 18	1N755A	. . SEMICONDUCTOR DEVICE, DIO V03877 353-2718-00 CR8		1
- 19	RC07GF103K	. . RESISTOR, FXD, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 R1		1
- 20	RC07GF562K	. . RESISTOR, FXD, 5600 OHMS 10%, 1/4 W V01121 745-0776-00 R8		1
- 21	RC07GF182K	. . RESISTOR, FXD, 1500 OHMS 10%, 1/4 W V01121 745-0758-00 R10		1

	FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
	4 - 22	RC07GF182K	. . RESISTOR, FXD, 1800 OHMS 10%, 1/4 W V01121 745-0758-00 R12		1
	- 23	RW69V3R9	. . RESISTOR, FXD, 3.9 OHMS 5%, 3 W V91637 747-5367-00 R30 EFF THRU MCN 996		1
R	- 23	RW69V3R3	. . RESISTOR, FXD, 3.3 OHMS 5%, 3 W V91637 747-5366-00 R30 EFF MCN 997		1
	- 24	RC20GF222K	. . RESISTOR, FXD, 2200 OHMS 10%, 1/2 W V01121 745-1366-00 R29		1
	- 25	K2R2J20S	. . CAPACITOR, FXD, 2.2 UF 20%, 20 VDCW V05397 184-7377-00 C6		1
	- 26	RC07GF221K	. . RESISTOR, FXD, 220 OHMS 10%, 1/4 W V01121 745-0725-00 R11		1
R	- 27	RC07GF823K	. . RESISTOR, FXD, 82,000 OHMS 10%, 1/4 W V01121 745-0818-00 R21		1
R	- 28	RC07GF823K	. . RESISTOR, FXD, 82,000 OHMS 10%, 1/4 W V01121 745-0818-00 R27		1
	- 29	K47J20S	. . CAPACITOR, FXD, 47 UF 20%, 20 VDCW V05397 184-7664-00 C28		1
	- 30	RC07GF154K	. . RESISTOR, FXD, 150,000 OHMS 10%, 1/4 W V01121 745-0827-00 R82		1
	- 31	RC07GF154K	. . RESISTOR, FXD, 150,000 OHMS 10%, 1/4 W V01121 745-0827-00 R119		1
	- 32	K47J20S	. . CAPACITOR, FXD, 47 UF 20%, 20 VDCW V05397 184-7664-00 C50		1
	- 33	RN60B2370F	. . RESISTOR, FXD, 237 OHMS 1%, 1/8 W V75042 705-6566-00 R54		1
	- 34	RN60B2370F	. . RESISTOR, FXD, 237 OHMS 1%, 1/8 W V75042 705-6566-00 R55		1
	- 35	1N457	. . SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR13		1
	- 36	RN60B23R7F	. . RESISTOR, FXD, 23.7 OHMS 1%, 1/8 W V75042 705-6518-00 R129		1
	- 37	1N457	. . SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR14		1
	- 38	1N457	. . SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR30		1
	- 39	RN60B1210F	. . RESISTOR, FXD, 121 OHMS 1%, 1/8 W V75042 705-6552-00 R130		1
	- 40	BJ24246	. . RESISTOR, VAR, 2500 OHMS 20%, 1/2 W V71450 380-1665-00 R58		1
			ATTACHING PARTS		
		COML	. . NUT, PLAIN, HEX. 334-0282-00		1
		1714-05-00-4102	. . WASHER, LOCK V78189 373-0090-00		1
			- - * - -		
	- 41	1N457	. . SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR31		1
	- 42	BJ24248	. . RESISTOR, VAR, 250 OHMS 20%, 1/2 W V71450 380-1667-00 R91		1
			ATTACHING PARTS		
		COML	. . NUT, PLAIN, HEX. 334-0282-00		1
		1714-05-00-4102	. . WASHER, LOCK V78189 373-0090-00		1
			- - * - -		
	- 43	1N457	. . SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR15		1
	- 44	1N457	. . SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR16		1
	- 45	1N457	. . SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR29		1

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
4 - 46	1N457	• • SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR35		1
- 47	1N457	• • SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR36		1
- 48	BJ24240	• • RESISTOR, VAR, 1000 OHMS 20%, 1/2 W V71450 380-1659-00 R59		1
		ATTACHING PARTS		
	COML	• • NUT, PLAIN, HEX. 334-0282-00		1
	1714-05-00-4102	• • WASHER, LOCK V78189 373-0090-00		1
		- - * - -		
- 49	549-6619-003	• • JACK ASSY, TIP		1
		ATTACHING PARTS		
	MS35200-2	• • SCREW, MACH. V77250 342-0132-00		3
		- - * - -		
- 50	SKT41WHT	• • • JACK, TIP V98291 360-0266-00 J1		1
- 51	SKT41WHT	• • • JACK, TIP V98291 360-0266-00 J2		1
- 52	F22NCFMA1-26	• • • NUT, SELF-LKG, CLINCH V72962 333-0837-00		3
- 53	549-6618-003	• • • BRACKET, ANGLE		1
R - 54	224L1-503	• • RESISTOR, VAR, 50,000 OHMS 5%, 1/2 W V80294 381-1290-00 R132		1
		ATTACHING PARTS		
	68-1660-26	• • NUT, SELF-LKG, HEX. V72962 333-0604-00		2
	MS35200-5	• • SCREW, MACH. V77250 342-0135-00		2
		- - * - -		
- 55	549-6606-00	• • WIRING HARNESS, BRANCHED		1
		ATTACHING PARTS		
	MS35649-44	• • NUT, PLAIN, HEX. V77250 313-0043-00		1
	68-1660-26	• • NUT, SELF-LKG, HEX. V72962 333-0604-00		4
	MS35335-57	• • WASHER, LOCK V78189 373-8010-00		1
	MS35200-12	• • SCREW, MACH. V77250 342-0044-00		1
	MS35200-3	• • SCREW, MACH. V77250 342-0133-00		4
		- - * - -		
- 56	DPA32-34PA101	• • • CONNECTOR, RECP V71468 370-2138-00 P1		1
- 57	549-6138-002	• • • TERMINAL, LUG		1
- 58	K22J15S	• • CAPACITOR, FXD, 22 UF 20%, 15 VDCW V05397 184-7373-00 C56		1
- 59	RN60B7502F	• • RESISTOR, FXD, 75,000 OHMS 1%, 1/8 W V75042 705-6686-00 R36		1
- 60	RC07GF683K	• • RESISTOR, FXD, 68,000 OHMS 10%, 1/4 W V01121 745-0815-00 R134		1
- 61	RC07GF563K	• • RESISTOR, FXD, 56,000 OHMS 10%, 1/4 W V01121 745-0812-00 R32		1
- 62	K22J15S	• • CAPACITOR, FXD, 22 UF 20%, 15 VDCW V05397 184-7373-00 C55		1
- 63	1N457	• • SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR17		1
- 64	RN60B2870F	• • RESISTOR, FXD, 287 OHMS 1%, 1/8 W V75042 705-6570-00 R92		1
- 65	1N457	• • SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR19		1
- 66	151D345X0035B2	• • CAPACITOR, FXD, 3.4 UF 20%, 35 VDCW V56289 184-8269-00 C53		1
- 67	1N457	• • SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR18		1
- 68	1N457	• • SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR20		1

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
- 69	1N457	. . SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR32		1
- 70	RN60B4220F	. . RESISTOR, FXD, 422 OHMS 1%, 1/8 W V75042 705-6578-00 R127		1
- 71	RN60B9090F	. . RESISTOR, FXD, 909 OHMS 1%, 1/8 W V75042 705-6594-00 R90		1
- 72	151D505X9020 X2	. . CAPACITOR, FXD, 5 UF 10%, 20 VDCW V56289 184-8366-00 C31		1
- 73	1N457	. . SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR12		1
- 74	RC07GF222K	. . RESISTOR, FXD, 2200 OHMS 10%, 1/4 W V01121 745-0761-00 R83 EFF THRU MCN 112		1
- 74	RC07GF562K	. . RESISTOR, FXD, 5600 OHMS 10%, 1/4 W V01121 745-0776-00 R83 EFF MCN 113		1
- 75	RC07GF272K	. . RESISTOR, FXD, 2700 OHMS 10%, 1/4 W V01121 745-0764-00 R85 EFF MCN 113		1
- 76	RC07GF182K	. . RESISTOR, FXD, 1800 OHMS 10%, 1/4 W V01121 745-0758-00 R26		1
- 77	RN60B7502F	. . RESISTOR, FXD, 75,000 OHMS 1%, 1/8 W V75042 705-6686-00 R34		1
- 78	RC07GF182K	. . RESISTOR, FXD, 1800 OHMS 10%, 1/4 W V01121 745-0758-00 R22		1
R - 78A	RC07GF224K	. . RESISTOR, FXD, 220,000 OHMS 10%, 1/4 W V01121 745-0833-00 R18		1
R - 78B	RC07GF224K	. . RESISTOR, FXD, 220,000 OHMS 10%, 1/4 W V01121 745-0833-00 R25		1
- 79	DM20F152G 500WV	. . CAPACITOR, FXD, 1500 UUF 2%, 500 VDCW V72136 912-3326-00 C7		1
- 80	RC07GF332K	. . RESISTOR, FXD, 3300 OHMS 10%, 1/4 W V01121 745-0767-00 R3		1
- 81	RC07GF332K	. . RESISTOR, FXD, 3300 OHMS 10%, 1/4 W V01121 745-0767-00 R17		1
- 82	RC07GF102K	. . RESISTOR, FXD, 1000 OHMS 10%, 1/4 W V01121 745-0749-00 R4		1
- 83	K3R3J15S	. . CAPACITOR, FXD, 3.3 UF 20%, 15 VDCW V05397 184-7403-00 C3		1
- 84	RC07GF331K	. . RESISTOR, FXD, 330 OHMS 10%, 1/4 W V01121 745-0731-00 R16		1
- 85	RC07GF332K	. . RESISTOR, FXD, 3300 OHMS 10%, 1/4 W V01121 745-0767-00 R15		1
- 86	RC07GF181K	. . RESISTOR, FXD, 180 OHMS 10%, 1/4 W V01121 745-0722-00 R5		1
- 87	RC07GF152K	. . RESISTOR, FXD, 1500 OHMS 10%, 1/4 W V01121 745-0755-00 R41		1
- 88	151D163X0035 A2	. . CAPACITOR, FXD, 16,000 UUF 20%, 35 VDCW V56289 184-8256-00 C1		1
- 89	K4R7J35S	. . CAPACITOR, FXD, 4.7 UF 20%, 35 VDCW V05397 184-7396-00 C40		1
- 90	1N457	. . SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR27		1
- 91	K47J20S	. . CAPACITOR, FXD, 47 UF 20%, 20 VDCW V05397 184-7664-00 C39		1
- 92	RC07GF563K	. . RESISTOR, FXD, 56,000 OHMS 10%, 1/4 W V01121 745-0812-00 R98		1
- 93	K100J10S	. . CAPACITOR, FXD, 100 UF 20%, 10 VDCW V05397 184-7651-00 C38		1
- 94	K100J10S	. . CAPACITOR, FXD, 100 UF 20%, 10 VDCW V05397 184-7651-00 C33		1
- 95	RC07GF563K	. . RESISTOR, FXD, 56,000 OHMS 10%, 1/4 W V01121 745-0812-00 R93		1

FIG.-ITEM	PART NO.	1 2 3 4 5 6 7 NOMENCLATURE	USAGE CODE	UNITS PER ASSY.
4 - 96	K47J20S	. . CAPACITOR, FXD, 47 UF 20%, 20 VDCW V05397 184-7664-00 C34		1
- 97	1N457	. . SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR21		1
- 98	K4R7J35S	. . CAPACITOR, FXD, 4.7 UF 20%, 35 VDCW V05397 184-7396-00 C35		1
- 99	151D905X9035 Y2	. . CAPACITOR, FXD, 9 UF 10%, 35 VDCW V56289 184-8367-00 C37		1
-100	1N457	. . SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR24		1
-101	RN60B7500F	. . RESISTOR, FXD, 750 OHMS 1%, 1/8 W V75042 705-6590-00 R94		1
-102	1N457	. . SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR23		1
-103	RN60B5620F	. . RESISTOR, FXD, 562 OHMS 1%, 1/8 W V75042 705-6584-00 R96		1
-104	1N457	. . SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR26		1
-105	RN60B7500F	. . RESISTOR, FXD, 750 OHMS 1%, 1/8 W V75042 705-6590-00 R95		1
-106	1N457	. . SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR25		1
-107	RN60B5620F	. . RESISTOR, FXD, 562 OHMS 1%, 1/8 W V75042 705-6584-00 R97		1
-108	RC07GF681K	. . RESISTOR, FXD, 680 OHMS 10%, 1/4 W V01121 745-0743-00 R57		1
-109	2N697	. . TRANSISTOR V96214 352-0197-00 Q23		1
-110	RC07GF222K	. . RESISTOR, FXD, 2200 OHMS 10%, 1/4 W V01121 745-0761-00 R120 EFF THRU MCN 112		1
-110	RC07GF562K	. . RESISTOR, FXD, 5600 OHMS 10%, 1/4 W V01121 745-0776-00 R120 EFF MCN 113		1
-111	K68J20S	. . CAPACITOR, FXD, 68 UF 20%, 20 VDCW V05397 184-7665-00 C51		1
-112	151D345X0035 B2	. . CAPACITOR, FXD, 3.4 UF 20%, 35 VDCW V56289 184-8269-00 C52		1
-113	151D345X0035 B2	. . CAPACITOR, FXD, 3.4 UF 20%, 35 VDCW V56289 184-8269-00 C30		1
-114	549-6615-003	. . POST, ELECTRICAL-MECHANICAL EQUIP.		1
-115	2104-04-01-2520N	. . TERMINAL, LUG V78189 304-0317-00		1
		ATTACHING PARTS FOR 114 AND 115		
	MS35216-13	. . SCREW, MACH. V77250 343-0134-00		1
		- - * - -		
-116	2N697	. . TRANSISTOR V96214 352-0197-00 Q16		1
-117	2N697	. . TRANSISTOR V96214 352-0197-00 Q5		1
-118	1N3253	. . SEMICONDUCTOR DEVICE, DIO V49671 353-3274-00 CR7		1
-119	2N697	. . TRANSISTOR V96214 352-0197-00 Q4		1
-120	K100J20S	. . CAPACITOR, FXD, 100 UF 20%, 20 VDCW V05397 184-7412-00 C14		1
-121	2N697	. . TRANSISTOR V96214 352-0197-00 Q2		1
-122	2N2201	. . TRANSISTOR V03508 352-0428-00 Q8		1
		ATTACHING PARTS		
	68-1660-26	. . NUT, SELF-LKG, HEX. V72962 333-0604-00		2
	MS35216-4	. . SCREW, MACH. V77250 343-0125-00		2
		- - * - -		
-123	KR047J35S	. . CAPACITOR, FXD, 47,000 UUF 20%, 35 VDCW V05397 184-7393-00 C5		1

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
4 -124	2N697	. . TRANSISTOR V96214 352-0197-00 Q1		1
-125	2N657A	. . TRANSISTOR V03508 352-0354-00 Q7 EFF THRU MCN 976		1
R -125	2N2405	. . TRANSISTOR V96214 352-0479-00 Q7 EFF MCN 977		1
-126	22R3T51FG	. . CAPACITOR, FXD, 510 UUF 2%, 300 VDCW V14655 912-0544-00 C4 EFF THRU MCN 112		1
-126	DM20F152G 500WV	. . CAPACITOR, FXD, 1500 UUF 2%, 500 VDCW V72136 912-3326-00 C4 EFF MCN 113		1
-126A	22R3T51EG	. . CAPACITOR, FXD, 510 UUF 2%, 300 VDCW V14655 912-0544-00 C58 EFF THRU MCN 112		1
-126A	DM20F152G 500WV	. . CAPACITOR, FXD, 1500 UUF 2%, 500 VDCW V72136 912-3326-00 C58 EFF MCN 113		1
-127	1N457	. . SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR1		1
-128	2N697	. . TRANSISTOR V96214 352-0197-00 Q6		1
-129	2N697	. . TRANSISTOR V96214 352-0197-00 Q9		1
-130	151D755X0020 B2	. . CAPACITOR, FXD, 7.5 UF 20%, 20 VDCW V56289 184-8278-00 C15		1
-131	997F20	. . RESISTOR, THRM, 500 OHMS 10%, 0.5 W V10646 714-1735-00 RT3		1
R -132	RC07GF104K	. . RESISTOR, FXD, 100,000 OHMS 10%, 1/4 W V01121 745-0821-00 R44		1
R -132A	RC07GF334K	. . RESISTOR, FXD, 330,000 OHMS 10%, 1/4 W V01121 745-0839-00 R43		1
-133	A12565	. . TRANSFORMER, AF V70674 667-0053-00 T1		1
-134	2104-04-01-2520N	. . TERMINAL, LUG V78189 304-0317-00		1
		ATTACHING PARTS FOR 133 AND 134		
	MS35216-11	. . SCREW, MACH. V77250 343-0132-00		2
	MS35335-57	. . WASHER, LOCK V78189 373-8010-00		2
		- - * - -		
-135	1N457	. . SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR39		1
-136	RC07GF472K	. . RESISTOR, FXD, 4700 OHMS 10%, 1/4 W V01121 745-0773-00 R7		1
-137	1N457	. . SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR33		1
-138	RC07GF472K	. . RESISTOR, FXD, 4700 OHMS 10%, 1/4 W V01121 745-0773-00 R6		1
-139	RC07GF122K	. . RESISTOR, FXD, 1200 OHMS 10%, 1/4 W V01121 745-0752-00 R128		1
-140	K4R7J35S	. . CAPACITOR, FXD, 4.7 UF 20%, 35 VDCW V05397 184-7396-00 C13		1
-141	1N457	. . SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR6		1
-142	1N457	. . SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR5		1
-143	151D345X0035 B2	. . CAPACITOR, FXD, 3.4 UF 20%, 35 VDCW V56289 184-8269-00 C11		1
-144	RC07GF333K	. . RESISTOR, FXD, 33,000 OHMS 10%, 1/4 W V01121 745-0803-00 R24		1
R -145	RC07GF333K	. . RESISTOR, FXD, 33,000 OHMS 10%, 1/4 W V01121 745-0803-00 R23		1
-146	997F14	. . RESISTOR, THRM, 10,000 OHMS 10%, 0.5 W V10646 714-1738-00 RT2		1
-147	RC07GF333K	. . RESISTOR, FXD, 33,000 OHMS 10%, 1/4 W V01121 745-0803-00 R20		1

FIG.-ITEM	PART NO.	1 2 3 4 5 6 7 NOMENCLATURE	USAGE CODE	UNITS PER ASSY.
4 -148	997F14	• • RESISTOR, THRM, 10,000 OHMS 10%, 0.5 W V10646 714-1738-00 RT1		1
R -149	RC07GF333K	• • RESISTOR, FXD, 33,000 OHMS 10%, 1/4 W V01121 745-0803-00 R19		1
-150	K47J35S	• • CAPACITOR, FXD, 47 UF 20%, 35 VDCW V05397 184-7411-00 C17		1
-151	L888M1333-3	• • CAPACITOR, FXD, 33,000 UUF 20%, 100 VDCW V96733 931-4482-00 C12		1
-152	L888M1333-3	• • CAPACITOR, FXD, 33,000 UUF 20%, 100 VDCW V96733 931-4482-00 C10		1
-153	K47J35S	• • CAPACITOR, FXD, 47 UF 20%, 35 VDCW V05397 184-7411-00 C16		1
-154	1N457	• • SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR41		1
-155	RC07GF472K	• • RESISTOR, FXD, 4700 OHMS 10%, 1/4 W V01121 745-0773-00 R40		1
-156	1N457	• • SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR11		1
-157	KR22J35S	• • CAPACITOR, FXD, 220,000 UUF 20%, 35 VDCW V05397 184-7407-00 C57		1
-158	RC07GF102K	• • RESISTOR, FXD, 1000 OHMS 10%, 1/4 W V01121 745-0749-00 R39		1
-159	1N3032A	• • SEMICONDUCTOR DEVICE, DIO V04713 353-1327-00 CR10		1
-160	RC07GF103K	• • RESISTOR, FXD, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 R51		1
-161	AB396-1	• • TERMINAL, STUD V12615 306-1281-00		1
R -162	AB3973	• • TERMINAL, STUD V12615 306-2221-010		1
		ATTACHING PARTS FOR 161 AND 162		
	MS35338-77	• • WASHER, LOCK V79807 310-0275-00		1
		- - * - -		
-163	RC07GF470K	• • RESISTOR, FXD, 47 OHMS 10%, 1/4 W V01121 745-0701-00 R47		1
-164	2N697	• • TRANSISTOR V96214 352-0197-00 Q11		1
-165	K10J20S	• • CAPACITOR, FXD, 10 UF 20%, 20 VDCW V05397 184-7375-00 C9		1
-166	1N457	• • SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR2		1
-167	2104-04-01-2520N	• • TERMINAL, LUG V78189 304-0317-00		1
-168	549-6615-003	• • POST, ELECTRICAL-MECHANICAL EQUIP.		1
		ATTACHING PARTS FOR 167 AND 168		
	MS35216-13	• • SCREW, MACH. V77250 343-0134-00		1
	MS35335-57	• • WASHER. LOCK V78189 373-8010-00		1
		- - * - -		
-169	RC07GF150K	• • RESISTOR, FXD, 15 OHMS 10%, 1/4 W V01121 745-0683-00 R49		1
-170	2N697	• • TRANSISTOR V96214 352-0197-00 Q10		1
-171	2N697	• • TRANSISTOR V96214 352-0197-00 Q3		1
-172	KR47J35S	• • CAPACITOR, FXD, 470,000 UUF 20%, 35 VDCW V05397 184-7399-00 C8		1
-173	AB396-1	• • TERMINAL, STUD V12615 306-1281-00		2
		ATTACHING PARTS		
	MS35216-2	• • SCREW, MACH. V77250 343-0123-00		2
	MS35338-77	• • WASHER, LOCK V79807 310-0275-00		2
		- - * - -		
-174	RC07GF103K	• • RESISTOR, FXD, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 R45		1
-175	RC07GF470K	• • RESISTOR, FXD, 47 OHMS 10%, 1/4 W V01121 745-0701-00 R50		1

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
R 4 -176	RC07GF331K	. . RESISTOR, FXD, 330 OHMS 10%, 1/4 W V01121 745-0731-00 R14		1
-177	RC07GF562K	. . RESISTOR, FXD, 5600 OHMS 10%, 1/4 W V01121 745-0776-00 R9		1
-178	RN60B9090F	. . RESISTOR, FXD, 909 OHMS 1%, 1/8 W V75042 705-6594-00 R13		1
-179	76-0102-67	. . FILTER, BAND PASS V88063 673-0961-00 FL1		1
-180	240-1036-00	. . INDUCTOR, RF TOROID L1		1
		ATTACHING PARTS FOR 179 AND 180		
	COML	. . SCREW, MACH. 343-0393-00		1
		- - * - -		
-180A	240-1036-00	. . INDUCTOR, RF TOROID L2		1
		ATTACHING PARTS		
	68-1660-26	. . NUT, SELF-LKG, HEX. V72962 333-0604-00		1
	MS35200-8	. . SCREW, MACH. V77250 342-0041-00		1
		- - * - -		
-181	1N457	. . SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR4		1
-182	1N457	. . SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR3		1
-183	RN60B1102F	. . RESISTOR, FXD, 11,000 OHMS 1%, 1/8 W V75042 705-6646-00 R33		1
-184	K68J20S	. . CAPACITOR, FXD, 68 UF 20%, 20 VDCW V05397 184-7665-00 C29		1
-185	RC07GF272K	. . RESISTOR, FXD, 2700 OHMS 10%, 1/4 W V01121 745-0764-00 R122		1
-186	94-0925-00	. . TRANSFORMER, AF V88063 667-0082-00 T2		1
-187	2104-04-01-2520N	. . TERMINAL, LUG V78189 304-0317-00		3
		ATTACHING PARTS FOR 186 AND 187		
	MS35649-44	. . NUT, PLAIN, HEX. V77250 313-0043-00		4
	MS35335-57	. . WASHER, LOCK V78189 373-8010-00		4
	MS35216-12	. . SCREW, MACH. V77250 343-0133-00		4
		- - * - -		
-188	997F20	. . RESISTOR, THRM, 500 OHMS 10%, 0.5 W V10646 714-1735-00 RT4		1
-189	AB396-1	. . TERMINAL, STUD V12615 306-1281-00		6
		ATTACHING PARTS		
	MS35200-2	. . SCREW, MACH. V77250 342-0132-00		6
	MS35338-77	. . WASHER, LOCK V79807 310-0275-00		6
		- - * - -		
-190	151D345X0035B2	. . CAPACITOR, FXD, 3.4 UF 20%, 35 VDCW V56289 184-8269-00 C32		1
-191	151D905X9035Y2	. . CAPACITOR, FXD, 9 UF 10%, 35 VDCW V56289 184-8367-00 C36		1
-192	RC07GF822K	. . RESISTOR, FXD, 8200 OHMS 10%, 1/4 W V01121 745-0782-00 R89		1
-193	RC07GF560K	. . RESISTOR, FXD, 56 OHMS 10%, 1/4 W V01121 745-0704-00 R88		1
-194	RC07GF100K	. . RESISTOR, FXD, 10 OHMS 10%, 1/4 W V01121 745-0677-00 R87		1
-195	RC07GF822K	. . RESISTOR, FXD, 8200 OHMS 10%, 1/4 W V01121 745-0782-00 R84		1
-196	2N697	. . TRANSISTOR V96214 352-0197-00 Q17		1
-197	2N697	. . TRANSISTOR V96214 352-0197-00 Q18		1
-198	RC07GF560K	. . RESISTOR, FXD, 56 OHMS 10%, 1/4 W V01121 745-0704-00 R86		1
-199	RC07GF560K	. . RESISTOR, FXD, 56 OHMS 10%, 1/4 W V01121 745-0704-00 R125		1

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
4 -200	RC07GF100K	• • RESISTOR, FXD, 10 OHMS 10%, 1/4 W V01121 745-0677-00 R123		1
-201	RC07GF560K	• • RESISTOR, FXD, 56 OHMS 10%, 1/4 W V01121 745-0704-00 R124		1
-202	RC07GF822K	• • RESISTOR, FXD, 8200 OHMS 10%, 1/4 W V01121 745-0782-00 R121		1
-203	2N697	• • TRANSISTOR V96214 352-0197-00 Q24		1
-204	2N697	• • TRANSISTOR V96214 352-0197-00 Q25		1
-205	RC07GF822K	• • RESISTOR, FXD, 8200 OHMS 10%, 1/4 W V01121 745-0782-00 R126		1
-206	RC07GF154K	• • RESISTOR, FXD, 150,000 OHMS 10%, 1/4 W V01121 745-0827-00 R131		1
-207	RC07GF154K	• • RESISTOR, FXD, 150,000 OHMS 10%, 1/4 W V01121 745-0827-00 R38		1
R -208	RN60B1212F	• • RESISTOR, FXD, 12,000 OHMS 1%, 1/8 W V75042 705-6648-00 R37		1
-209	1N457	• • SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR37		1
-210	RC07GF563K	• • RESISTOR, FXD, 56,000 OHMS 10%, 1/4 W V01121 745-0812-00 R133		1
-211	1N457	• • SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR22		1
-212	RC07GF473K	• • RESISTOR, FXD, 47,000 OHMS 10%, 1/4 W V01121 745-0809-00 R136		1
-213	1N457	• • SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR38		1
-214	RN60B8252F	• • RESISTOR, FXD, 82,500 OHMS 1%, 1/8 W V75042 705-6688-00 R135 EFF THRU MCN 112		1
R -214	RN60B1003F	• • RESISTOR, FXD, 100,000 OHMS 1%, 1/8 W V75042 705-6692-00 R135		AR
R -214	RN60B1103F	• • RESISTOR, FXD, 110,000 OHMS 1%, 1/8 W V75042 705-6694-00 R135		AR
R -214	RN60D1213F	• • RESISTOR, FXD, 121,000 OHMS 1%, 1/8 W V75042 705-6696-00 R135		AR
-215	RN60B1473F	• • RESISTOR, FXD, 147,000 OHMS 1%, 1/8 W V75042 705-6700-00 R35 EFF THRU MCN 112		1
R -215	RN60D1333F	• • RESISTOR, FXD, 133,000 OHMS 1%, 1/8 W V75042 705-6698-00 R35		AR
R -215	RN60B1473F	• • RESISTOR, FXD, 147,000 OHMS 1%, 1/8 W V75042 705-6700-00 R35		AR
R -215	RN60B1623F	• • RESISTOR, FXD, 162,000 OHMS 1%, 1/8 W V75042 705-6702-00		AR
-216	1N457	• • SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR28		1
-217	60E193	• • FILTER, BAND PASS V59446 673-0823-00 FL3		1
-218	2104-04-01-2520N	• • TERMINAL, LUG V78189 304-0317-00		2
		ATTACHING PARTS FOR 217 AND 218		
	MS35649-44	• • NUT, PLAIN, HEX. V77250 313-0043-00		4
		— — * — —		
-219	549-6615-003	• • POST, ELECTRICAL-MECHANICAL EQUIP.		1
		ATTACHING PARTS		
	MS35216-13	• • SCREW, MACH. V77250 343-0134-00		1
	MS35335-57	• • WASHER, LOCK V78189 373-8010-00		1
		— — * — —		
-220	D10405	• • TRANSFORMER, AF V70674 667-0083-00 T3		1
-221	2104-06-02-2520N	• • TERMINAL, LUG V78189 304-0318-00 EFF MCN 113		1

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
4		ATTACHING PARTS FOR 220 AND 221		
	COML	. . NUT, PLAIN, HEX. 313-0045-00		4
	MS35338-79	. . WASHER, LOCK V79807 310-0282-00		3
	MS35335-58	. . WASHER, LOCK V78189 373-8020-00 EFF MCN 113		1
		- - * - -		
-222	G4777-10	. . TERMINAL, STUD V12615 306-1018-00		18
		ATTACHING PARTS		
	MS35206-2	. . SCREW, MACH. V77250 342-0132-00		18
		- - * - -		
-223	76-0102-37	. . FILTER, BAND PASS V88063 673-0960-00 FL2		1
		ATTACHING PARTS		
	MS35206-12	. . SCREW, MACH. V77250 342-0044-00		1
		- - * - -		
-224	1101A	. . MOUNTING, TSTR V07896 352-9814-00 XQ3, XQ10, XQ11, XQ17, XQ18, XQ24, XQ25		7
		ATTACHING PARTS		
	AN345B10	. . NUT, PLAIN, HEX. V77250 313-0056-00		7
	MS35338-81	. . WASHER, LOCK V79807 310-0284-00		7
	COML	. . WASHER, FLAT 310-0060-00		7
	IMC140	. . INSULATOR, WASH. V10583 302-0410-00		14
	548-9539-002	. . WASHER		7
		- - * - -		
-225	549-6620-004	. . CHASSIS, ELECTRICAL-MECHANICAL EQUIP.		1
-226	3307X	. . . SOCKET, TSTR V91662 352-9903-00 XQ1, XQ2, XQ4 THRU XQ7, XQ9, XQ16, XQ23		9
		ATTACHING PARTS		
	757	. . . RETAINER, TSTR SOC V91662 352-9904-00		9
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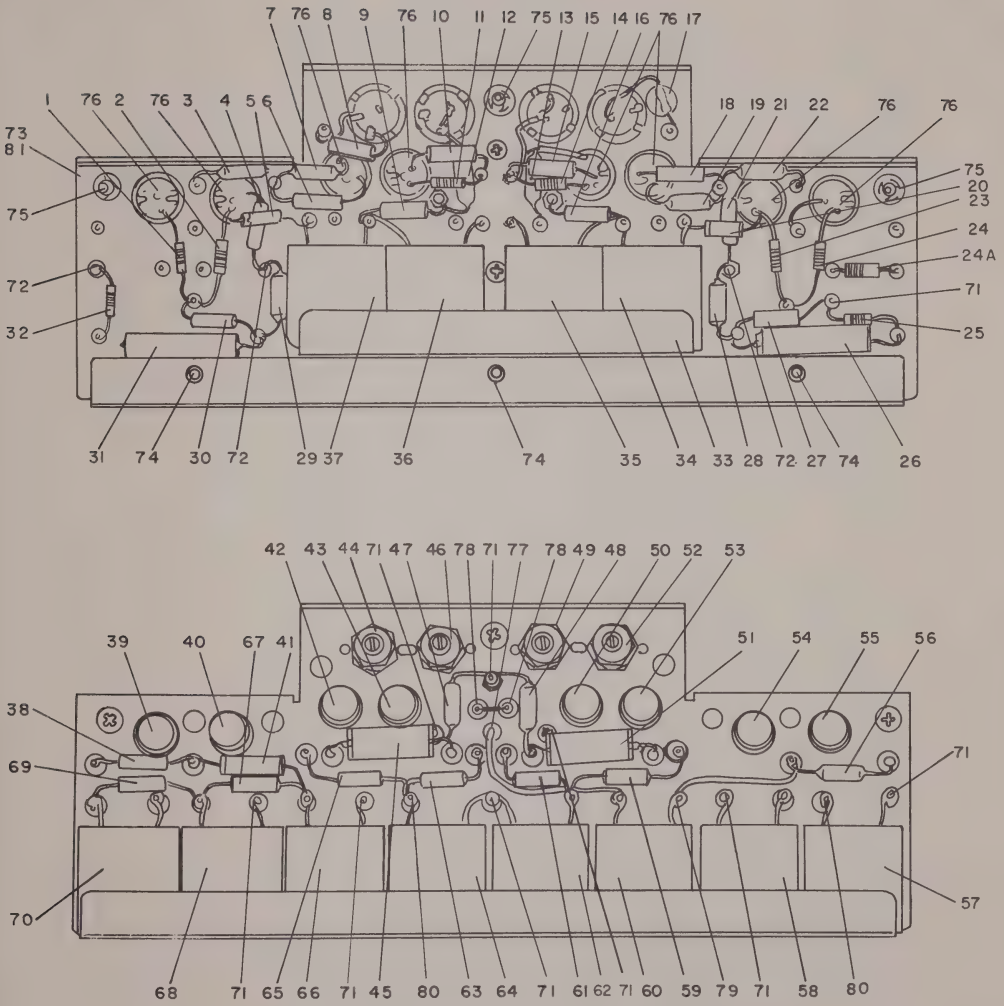
-227	SL174-198	. . . TERMINAL, FEEDTHRU V12615 306-1271-00		1
-228	SL158-198	. . . TERMINAL, FEEDTHRU V12615 306-1270-00		42
R -229	SL173-197	. . . TERMINAL, STANDOFF V12615 306-1261-00		41
-230	491CADPL	. . . EYELET, METALLIC V01881 307-1047-00		1
-231	F12NCFMA1-62	. . . NUT, SELF-LKG, CLINCH V72962 333-0841-00		2
-232	FTSM14	. . . TERMINAL, FEEDTHRU V98291 306-0721-00		14
-233	G3821	. . . TERMINAL, STUD V12615 306-1306-00		7
-234	RM52LHTA51-62	. . . NUT, SELF-LKG, PLATE V72962 333-1107-00		1
		ATTACHING PARTS		
	MS20426AD3-3	. . . RIVET, SOLID V12014 305-1361-00		2
		- - * - -		
-235	549-6624-00	. . . CHASSIS, ELECTRICAL EQUIP.		1
5 -	549-6605-00	AMPLIFIER ASSY SEE FIG. 4-5 AND 6-8 FOR NHA		REF
- 1	RC07GF122K	. RESISTOR, FXD, 1200 OHMS 10%, 1/4 W V01121 745-0752-00 R103		1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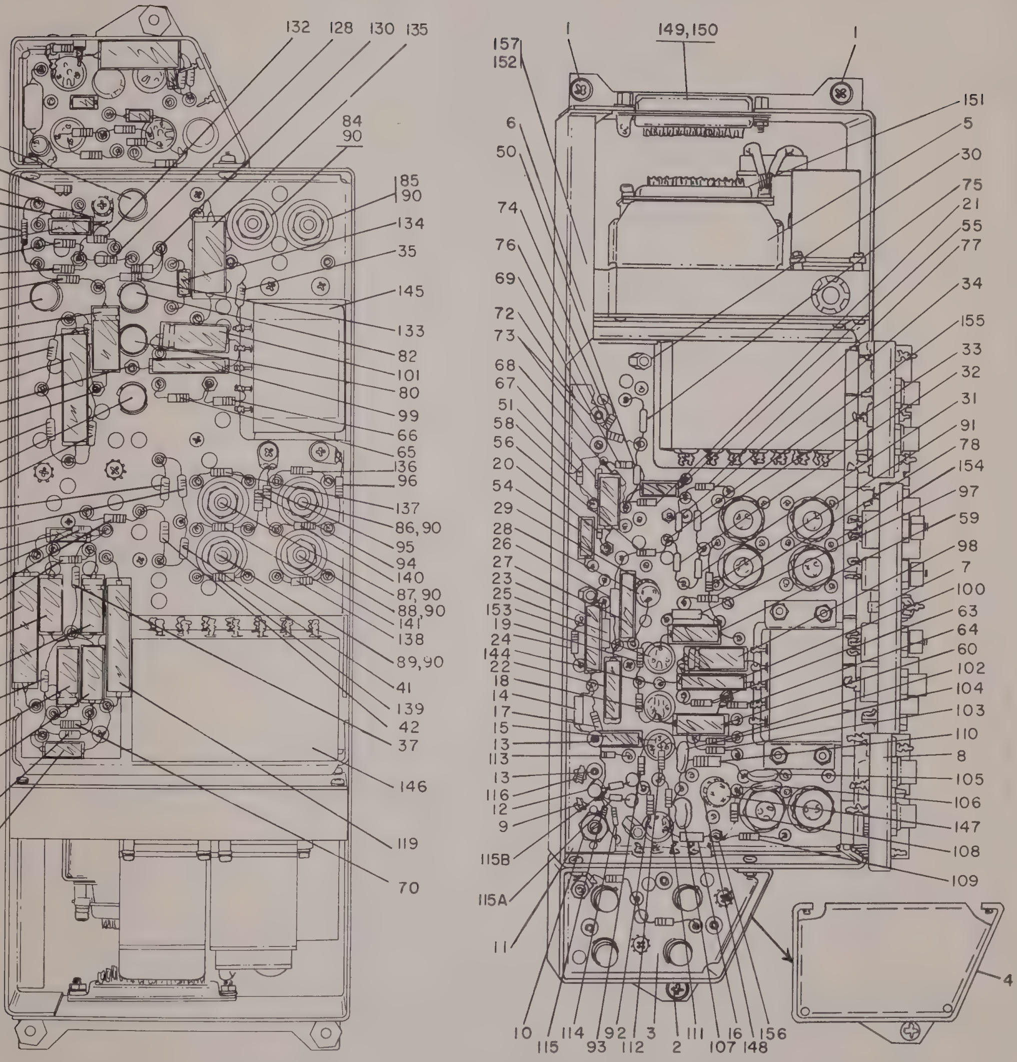
Amplifier Assembly
Figure 5

FIG.-ITEM	PART NO.	1 2 3 4 5 6 7 NOMENCLATURE	USAGE CODE	UNITS PER ASSY.
5 - 2	RC07GF332K	• RESISTOR, FXD, 3300 OHMS 10%, 1/4 W V01121 745-0767-00 R108		1
- 3	RN60B1961F	• RESISTOR, FXD, 1960 OHMS 1%, 1/8 W V75042 705-6610-00 R113		1
- 4	RN60B1960F	• RESISTOR, FXD, 196 OHMS 1%, 1/8 W V75042 705-6562-00 R107		1
- 5	K2R2J20S	• CAPACITOR, FXD, 2.2 UF 20%, 20 VDCW V05397 184-7377-00 C45		1
- 6	RN60B1004F	• RESISTOR, FXD, 1 MEG 1%, 1/8 W V75042 705-6740-00 R112		1
- 7	RN60B1961F	• RESISTOR, FXD, 1960 OHMS 1%, 1/8 W V75042 705-6610-00 R114		1
- 8	RN60B2613F	• RESISTOR, FXD, 261,000 OHMS 1%, 1/8 W V75042 705-6712-00 R99		1
- 9	RN60B4422F	• RESISTOR, FXD, 44,200 OHMS 1%, 1/8 W V75042 705-6675-00 R111		1
- 10	RN60B1473F	• RESISTOR, FXD, 147,000 OHMS 1%, 1/8 W V75042 705-6700-00 R115		1
- 11	RC07GF332K	• RESISTOR, FXD, 3300 OHMS 10%, 1/4 W V01121 745-0767-00 R118		1
- 12	RN60B1960F	• RESISTOR, FXD, 196 OHMS 1%, 1/8 W V75042 705-6562-00 R117		1
- 13	RN60B1960F	• RESISTOR, FXD, 196 OHMS 1%, 1/8 W V75042 705-6562-00 R80		1
- 14	RC07GF332K	• RESISTOR, FXD, 3300 OHMS 10%, 1/4 W V01121 745-0767-00 R81		1
- 15	RN60B1473F	• RESISTOR, FXD, 147,000 OHMS 1%, 1/8 W V75042 705-6700-00 R78		1
- 16	RN60B4422F	• RESISTOR, FXD, 44,200 OHMS 1%, 1/8 W V75042 705-6675-00 R74		1
- 17	C9136	• RESISTOR, FXD, 127,000 OHMS 1%, 1/4 W V15909 748-9136-00 R60		1
- 18	RN60B1004F	• RESISTOR, FXD, 1 MEG 1%, 1/8 W V75042 705-6740-00 R75		1
R - 19	RN60B1961F	• **RESISTOR, FXD, 1960 OHMS 1%, 1/8 W V75042 705-6610-00 R77**		1
- 20	K2R2J20S	• CAPACITOR, FXD, 2.2 UF 20%, 20 VDCW V05397 184-7377-00 C23		1
- 21	RN60B1960F	• RESISTOR, FXD, 196 OHMS 1%, 1/8 W V75042 705-6562-00 R70		1
- 22	RN60B1961F	• RESISTOR, FXD, 1960 OHMS 1%, 1/8 W V75042 705-6610-00 R76		1
- 23	RC07GF332K	• RESISTOR, FXD, 3300 OHMS 10%, 1/4 W V01121 745-0767-00 R71		1
- 24	RC07GF122K	• RESISTOR, FXD, 1200 OHMS 10%, 1/4 W V01121 745-0752-00 R66		1
R - 24A	997F22	• **RESISTOR, THRM, 4000 OHMS 10%, 1/2 W V10646 714-1741-00 RT5**		1
- 25	RC07GF392K	• RESISTOR, FXD, 3900 OHMS 10%, 1/4 W V01121 745-0770-00 R68		1
- 26	151D166X0010B2	• CAPACITOR, FXD, 16 UF 20%, 10 VDCW V56289 184-8288-00 C22		1
- 27	RN60B1473F	• RESISTOR, FXD, 147,000 OHMS 1%, 1/8 W V75042 705-6700-00 R67		1
- 28	RN60B1782F	• RESISTOR, FXD, 17,800 OHMS 1%, 1/8 W V75042 705-6656-00 R69		1
- 29	RN60B1782F	• RESISTOR, FXD, 17,800 OHMS 1%, 1/8 W V75042 705-6656-00 R106		1

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
5 - 30	RN60B1473F	• RESISTOR, FXD, 147,000 OHMS 1%, 1/8 W V75042 705-6700-00 R104		1
- 31	151D166X0010 B2	• CAPACITOR, FXD, 16 UF 20%, 10 VDCW V56289 184-8288-00 C44		1
- 32	RC07GF392K	• RESISTOR, FXD, 3900 OHMS 10%, 1/4 W V01121 745-0770-00 R105		1
- 33	549-6614-003	• RETAINER, CAPACITOR		1
- 34	1ADU1S2PORM 2PCTE	• CAPACITOR, FXD, 20,000 UUF 2%, 100 VDCW V14655 912-2112-00 C25		1
- 35	1ADU1S2PORM 2PCTE	• CAPACITOR, FXD, 20,000 UUF 2%, 100 VDCW V14655 912-2112-00 C26		1
- 36	1ADU1S2PORM 2PCTE	• CAPACITOR, FXD, 20,000 UUF 2%, 100 VDCW V14655 912-2112-00 C48		1
- 37	1ADU1S2PORM 2PCTE	• CAPACITOR, FXD, 20,000 UUF 2%, 100 VDCW V14655 912-2112-00 C47		1
- 38	RN60B1004F	• RESISTOR, FXD, 1 MEG 1%, 1/8 W V75042 705-6740-00 R65		1
- 39	2N2386	• TRANSISTOR V96214 352-0427-00 Q12		1
- 40	2N697	• TRANSISTOR V96214 352-0197-00 Q13		1
- 41	K2R2J35S	• CAPACITOR, FXD, 2.2 UF 20%, 35 VDCW V05397 184-7397-00 C21		1
- 42	2N2386	• TRANSISTOR V96214 352-0427-00 Q14		1
- 43	2N697	• TRANSISTOR V96214 352-0197-00 Q15		1
- 44	BJ24238	• RESISTOR, VAR, 10,000 OHMS 20%, 1/2 W V71450 380-1657-00 R61		1
		ATTACHING PARTS		
	COML	• NUT, PLAIN, HEX. 334-0282-00		1
	1714-05-00-4102	• WASHER, LOCK V78189 373-0090-00		1
		- - * - -		
- 45	K47J20S	• CAPACITOR, FXD, 47 UF 20%, 20 VDCW V05397 184-7664-00 C27		1
- 46	BM24956	• RESISTOR, VAR, 100,000 OHMS 20%, 1/2 W V71450 380-1673-00 R64		1
		ATTACHING PARTS		
	COML	• NUT, PLAIN, HEX. 334-0282-00		1
	1714-05-00-4102	• WASHER, LOCK V78189 373-0090-00		1
		- - * - -		
- 47	RN60B1782F	• RESISTOR, FXD, 17,800 OHMS 1%, 1/8 W V75042 705-6656-00 R79		1
- 48	RN60B1782F	• RESISTOR, FXD, 17,800 OHMS 1%, 1/8 W V75042 705-6656-00 R116		1
- 49	BM24956	• RESISTOR, VAR, 100,000 OHMS 20%, 1/2 W V71450 380-1673-00 R101		1
		ATTACHING PARTS		
	COML	• NUT, PLAIN, HEX. 334-0282-00		1
	1714-05-00-4102	• WASHER, LOCK V78189 373-0090-00		1
		- - * - -		
- 50	2N697	• TRANSISTOR V96214 352-0197-00 Q22		1
- 51	K47J20S	• CAPACITOR, FXD, 47 UF 20%, 20 VDCW V05397 184-7664-00 C49		1
- 52	BJ24232	• RESISTOR, VAR, 25,000 OHMS 20%, 1/2 W V71450 380-1651-00 R100		1
		ATTACHING PARTS		
	COML	• NUT, PLAIN, HEX. 334-0282-00		1
	1714-05-00-4102	• WASHER, LOCK V78189 373-0090-00		1
		- - * - -		

	FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
	5 - 53	2N2386	. TRANSISTOR V96214 352-0427-00 Q21		1
	- 54	2N697	. TRANSISTOR V96214 352-0197-00 Q20		1
	- 55	2N2386	. TRANSISTOR V96214 352-0427-00 Q19		1
	- 56	RN60B1003F	. RESISTOR, FXD, 100,000 OHMS 1%, 1/8 W V75042 705-6692-00 R102		1
R	- 57	**1ADU1S4PORM 2PCTE**	**. CAPACITOR, FXD, 40,000 UUF 2%, 100 VDCW V14655 912-2120-00 C41**		1
	- 58	1ADU1S4PORM 2PCTE	. CAPACITOR, FXD, 40,000 UUF 2%, 100 VDCW V14655 912-2120-00 C42		1
	- 59	RN60B8662F	. RESISTOR, FXD, 86,600 OHMS 1%, 1/8 W V75042 705-6689-00 R109		1
	- 60	1ADU1S2PORM 2PCTE	. CAPACITOR, FXD, 20,000 UUF 2%, 100 VDCW V14655 912-2112-00 C43		1
	- 61	RN60B8662F	. RESISTOR, FXD, 86,600 OHMS 1%, 1/8 W V75042 705-6689-00 R110		1
	- 62	1ADU1S4PORM 2PCTE	. CAPACITOR, FXD, 40,000 UUF 2%, 100 VDCW V14655 912-2120-00 C46		1
	- 63	RN60B8662F	. RESISTOR, FXD, 86,600 OHMS 1%, 1/8 W V75042 705-6689-00 R73		1
	- 64	1ADU1S4PORM 2PCTE	. CAPACITOR, FXD, 40,000 UUF 2%, 100 VDCW V14655 912-2120-00 C24		1
	- 65	RN60B8662F	. RESISTOR, FXD, 86,600 OHMS 1%, 1/8 W V75042 705-6689-00 R72		1
	- 66	1ADU1S4PORM 2PCTE	. CAPACITOR, FXD, 40,000 UUF 2%, 100 VDCW V14655 912-2120-00 C20		1
	- 67	RN60B2613F	. RESISTOR, FXD, 261,000 OHMS 1%, 1/8 W V75042 705-6712-00 R63		1
	- 68	1ADU1S4PORM 2PCTE	. CAPACITOR, FXD, 40,000 UUF 2%, 100 VDCW V14655 912-2120-00 C19		1
	- 69	RN60B2613F	. RESISTOR, FXD, 261,000 OHMS 1%, 1/8 W V75042 705-6712-00 R62		1
	- 70	1ADU1S4PORM 2PCTE	. CAPACITOR, FXD, 40,000 UUF 2%, 100 VDCW V14655 912-2120-00 C18		1
	- 71	AB396-1	. TERMINAL, STUD V12615 306-1281-00		9
			ATTACHING PARTS		
		MS35200-2	. SCREW, MACH. V77250 342-0132-00		3
		MS35216-2	. SCREW, MACH. V77250 343-0123-00		3
		MS35338-77	. WASHER, LOCK V79807 310-0275-00		6
			- - * - -		
R	- 72	AB3973	**. TERMINAL, STUD V12615 306-2221-010**		3
			ATTACHING PARTS		
		MS35338-77	. WASHER, LOCK V79807 310-0275-00		3
			- - * - -		
	- 73	549-6627-005	. PLATE, CHASSIS		1
	- 74	FHS440-5	. . STUD, CAPTIVE V46384 330-2793-00		3
	- 75	506-6072-002	. . SCREW, CAPTIVE		3
			ATTACHING PARTS		
		5105-9	. . RING, RETAINING V89462 340-0168-00		3
			- - * - -		
	- 76	3307X	. . SOCKET, TSTR V91662 352-9903-00 XQ12 THRU XQ15, XQ19 THRU XQ22		8
			ATTACHING PARTS		
		757	. . RETAINER, TSTR SOC V91662 352-9904-00		8
			- - * - -		
	- 77	T147	. . INSULATOR, BUSH. V12615 306-1099-00		1
	- 78	SL173-197	. . TERMINAL, STANDOFF V12615 306-1261-00		8
	- 79	G2621	. . TERMINAL, STUD V12615 306-1100-00		12
R	- 80	**SL174-198**	**. . TERMINAL, FEEDTHRU V12615 306-1271-00**		19
	- 81	549-6626-005	. . PLATE, CHASSIS		1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344F-1 Automatic VOR Air Navigation
Figure 6

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
6 -	522-3197-011	344F-1 AUTOMATIC VOR AIR NAVIGATION INSTRUMENTATION UNIT W/O RMI SEE FIG. 1-5 FOR NHA	A,D G,K	REF
6 -	522-3197-00	344F-1 AUTOMATIC VOR AIR NAVIGATION INSTRUMENTATION UNIT W/ RMI SEE FIG. 1-5 FOR NHA	B,C H,J	REF
- 1	COML	. SCREW, MACH. 343-0172-00		2
- 2	MS35216-26	. SCREW, MACH. V77250 343-0170-00		1
		ATTACHING PARTS FOR 1 AND 2		
	553-2411-002	. NUT, BLANK		3
	COML	. WASHER, FLAT 310-0046-00		3
		- - * - -		
- 3	553-2343-00	. RADIO MAGNETIC INDICATOR ELECTRONIC CONTROL AMPLIFIER SEE FIG. 7	B,C H,J	1
		ATTACHING PARTS		
	MS35216-12	. SCREW, MACH. V77250 343-0133-00	B,C H,J	4
		- - * - -		
- 4	553-2369-003	. BRACKET, MTG	A,D G,K	1
		ATTACHING PARTS		
	MS35216-12	. SCREW, MACH. V77250 343-0133-00	A,D G,K	4
		- - * - -		
- 5	553-2385-005	. BEARING SERVO MECHANISM SEE FIG. 8		1
		ATTACHING PARTS		
	MS35200-12	. SCREW, MACH. V77250 342-0044-00		4
	20419	. SCREW LOCK ASSY V71468 371-0040-00		2
		- - * - -		
- 6	553-2344-00	. INSTRUMENTATION UNIT, AIR NAVIGATION, AUTOMATIC VOR		1
- 7	1065CADPL	. . STRAP, RETAINING V71785 139-0406-00		1
		ATTACHING PARTS		
	MS35649-44	. . NUT, PLAIN, HEX. V77250 313-0043-00		1
	MS35338-78	. . WASHER, LOCK V79807 310-0279-00		1
		- - * - -		
- 8	549-6605-00	. . AMPLIFIER ASSY SEE FIG. 5		1
		ATTACHING PARTS		
	MS35649-44	. . NUT, PLAIN, HEX. V77250 313-0043-00		2
	MS35338-78	. . WASHER, LOCK V79807 310-0279-00		2
		- - * - -		
- 9	RC07GF102K	. . RESISTOR, FXD, 1000 OHMS 10%, 1/4 W V01121 745-0749-00 R1		1
- 10	BJ24231	. . RESISTOR, VAR, 5000 OHMS 20%, 1/2 W V71450 380-1650-00 R2		1
		ATTACHING PARTS		
	COML	. . NUT, PLAIN, HEX. 334-0282-00		1
	1714-05-00-4102	. . WASHER, LOCK V78189 373-0090-00		1
		- - * - -		
- 11	553-2364-003	. . JACK ASSY, TIP		1
		ATTACHING PARTS		
	MS35200-3	. . SCREW, MACH. V77250 342-0133-00		2
		- - * - -		
- 12	SL173-197	. . . TERMINAL, STANDOFF V12615 306-1261-00		1
- 13	SKT41WHT	. . . JACK, TIP V98291 360-0266-00 J1, J2		2
- 14	K10J20S	. . CAPACITOR, FXD, 10 UF 20%, 20 VDCW V05397 184-7375-00 C1		1
- 15	K10J20S	. . CAPACITOR, FXD, 10 UF 20%, 20 VDCW V05397 184-7375-00 C3		1

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
6 - 16	K10J20S	• • CAPACITOR, FXD, 10 UF 20%, 20 VDCW V05397 184-7375-00 C5		1
- 17	RN60B1210F	• • RESISTOR, FXD, 121 OHMS 1%, 1/8 W V75042 705-6552-00 R97		1
- 18	RC07GF154K	• • RESISTOR, FXD, 150,000 OHMS 10%, 1/4 W V01121 745-0827-00 R82		1
- 19	RC07GF154K	• • RESISTOR, FXD, 150,000 OHMS 10%, 1/4 W V01121 745-0827-00 R119		1
- 20	RC07GF154K	• • RESISTOR, FXD, 150,000 OHMS 10%, 1/4 W V01121 745-0827-00 R37		1
- 21	RC07GF154K	• • RESISTOR, FXD, 150,000 OHMS 10%, 1/4 W V01121 745-0827-00 R44		1
- 22	151D206X9010 X2	• • CAPACITOR, FXD, 20 UF 10%, 10 VDCW V56289 184-8370-00 C40		1
- 23	151D116X9015 X2	• • CAPACITOR, FXD, 20 UF 10%, 10 VDCW V56289 184-8369-00 C39		1
- 24	RN60B7502F	• • RESISTOR, FXD, 75,000 OHMS 1%, 1/8 W V75042 705-6686-00 R127		1
- 25	RN60B2610F	• • RESISTOR, FXD, 261 OHMS 1%, 1/8 W V75042 705-6568-00 R96		1
- 26	RN60B2610F	• • RESISTOR, FXD, 261 OHMS 1%, 1/8 W V75042 705-6568-00 R95		1
- 27	151D905X9015 X2	• • CAPACITOR, FXD, 9 UF 10%, 15 VDCW V56289 184-8368-00 C38		1
- 28	DOT38	• • TRANSFORMER, AF V80223 677-1521-00 T1		1
- 29	TXBP032-037-3	• • HOLDER, SEMICONDUCTOR V98978 352-9885-00		1
		ATTACHING PARTS		
	MS35216-11	• • SCREW, MACH. V77250 343-0132-00		1
	MS35335-57	• • WASHER, LOCK V78189 373-8010-00		1
		- - * - -		
- 30	549-6613-003	• • BRACKET, ANGLE		3
		ATTACHING PARTS		
	MS35216-13	• • SCREW, MACH. V77250 343-0134-00		3
	MS35335-57	• • WASHER, LOCK V78189 373-8010-00		3
	4007-4HOT TINNED	• • TERMINAL, LUG V77147 304-0015-00		1
		- - * - -		
- 31	1N457	• • SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR10		1
- 32	1N457	• • SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR9		1
- 33	1N457	• • SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR11		1
- 34	1N457	• • SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR8		1
- 35	1N457	• • SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR1		1
- 36	1N457	• • SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR4		1
- 37	1N457	• • SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR5		1
- 38	1N457	• • SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR6		1
- 39	1N457	• • SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR2		1
- 40	1N457	• • SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR24		1
- 41	1N457	• • SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR15		1

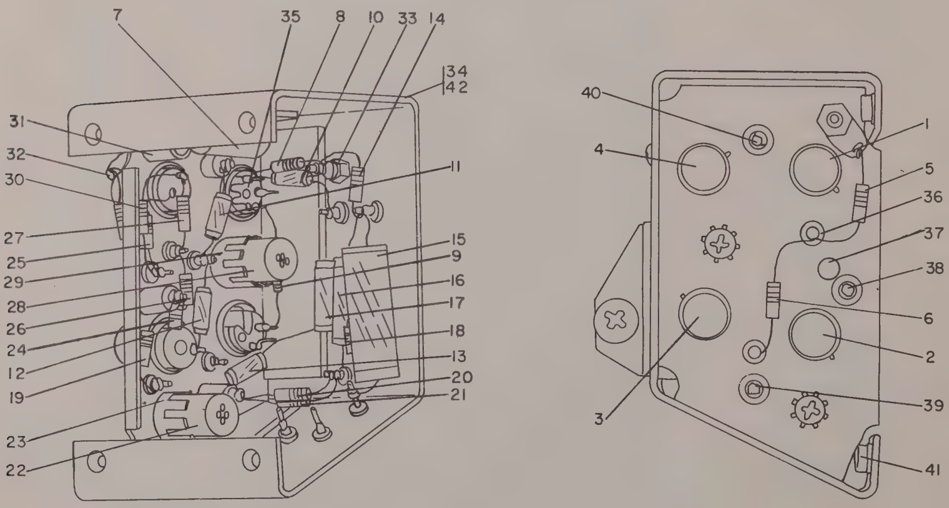
FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
6 - 42	1N457	• • SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR12		1
- 43	1N457	• • SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR13		1
- 44	1N457	• • SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR14		1
- 45	1N457	• • SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR19		1
- 46	1N457	• • SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR16		1
- 47	1N457	• • SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR17		1
- 48	1N457	• • SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR18		1
- 49	1N457	• • SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR7		1
- 50	1N457	• • SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR21		1
- 51	1N457	• • SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR20		1
- 52		DELETED		
- 53		DELETED		
- 54	K22J15S	• • CAPACITOR, FXD, 22 UF 20%, 15 VDCW V05397 184-7373-00 C57		1
- 55	K22J15S	• • CAPACITOR, FXD, 22 UF 20%, 15 VDCW V05397 184-7373-00 C58		1
- 56	RC07GF102K	• • RESISTOR, FXD, 1000 OHMS 10%, 1/4 W V01121 745-0749-00 R92		1
- 57	RC07GF102K	• • RESISTOR, FXD, 1000 OHMS 10%, 1/4 W V01121 745-0749-00 R94		1
- 58	K47J20S	• • CAPACITOR, FXD, 47 UF 20%, 20 VDCW V05397 184-7664-00 C59		1
- 59	K47J20S	• • CAPACITOR, FXD, 47 UF 20%, 20 VDCW V05397 184-7664-00 C50		1
- 60	K47J20S	• • CAPACITOR, FXD, 47 UF 20%, 20 VDCW V05397 184-7664-00 C28		1
- 61	K47J20S	• • CAPACITOR, FXD, 47 UF 20%, 20 VDCW V05397 184-7664-00 C36		1
- 62	K47J20S	• • CAPACITOR, FXD, 47 UF 20%, 20 VDCW V05397 184-7664-00 C33		1
- 63	RC07GF222K	• • RESISTOR, FXD, 2200 OHMS 10%, 1/4 W V01121 745-0761-00 R83 EFF THRU MCN 106		1
- 63	RC07GF562K	• • RESISTOR, FXD, 5600 OHMS 10%, 1/4 W V01121 745-0776-00 R83 EFF MCN 107		1
- 64	RC07GF222K	• • RESISTOR, FXD, 2200 OHMS 10%, 1/4 W V01121 745-0761-00 R122		1
- 65	RC07GF222K	• • RESISTOR, FXD, 2200 OHMS 10%, 1/4 W V01121 745-0761-00 R120 EFF THRU MCN 106		1
- 65	RC07GF562K	• • RESISTOR, FXD, 5600 OHMS 10%, 1/4 W V01121 745-0776-00 R120 EFF MCN 107		1
- 66	RC07GF222K	• • RESISTOR, FXD, 2200 OHMS 10%, 1/4 W V01121 745-0761-00 R85		1
- 67	RC07GF683K	• • RESISTOR, FXD, 68,000 OHMS 10%, 1/4 W V01121 745-0815-00 R38		1
- 68	RC07GF563K	• • RESISTOR, FXD, 56,000 OHMS 10%, 1/4 W V01121 745-0812-00 R43		1

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
6 - 69	RC07GF563K	. . RESISTOR, FXD, 56,000 OHMS 10%, 1/4 W V01121 745-0812-00 R41		1
- 70	RC07GF563K	. . RESISTOR, FXD, 56,000 OHMS 10%, 1/4 W V01121 745-0812-00 R98		1
- 71	RC07GF563K	. . RESISTOR, FXD, 56,000 OHMS 10%, 1/4 W V01121 745-0812-00 R90		1
- 72	553-2355-00	. . JACK ASSY, TIP		1
		ATTACHING PARTS		
	MS35200-3	. . SCREW, MACH. V77250 342-0133-00		2
		- - * - -		
- 73	SKT41WHT	. . . JACK, TIP V98291 360-0266-00 J3, J4		2
- 74	RN60B1473F	. . RESISTOR, FXD, 147,000 OHMS 1%, 1/8 W V75042 705-6700-00 R39		1
- 75	RC07GF473K	. . RESISTOR, FXD, 47,000 OHMS 10%, 1/4 W V01121 745-0809-00 R42		1
- 76	RN60B9092F	. . RESISTOR, FXD, 90,900 OHMS 1%, 1/8 W V75042 705-6690-00 R40		1
- 77	RC07GF271K	. . RESISTOR, FXD, 270 OHMS 10%, 1/4 W V01121 745-0728-00 R91		1
- 78	RC07GF271K	. . RESISTOR, FXD, 270 OHMS 10%, 1/4 W V01121 745-0728-00 R93		1
- 79	2N697	. . TRANSISTOR V96214 352-0197-00 Q23		1
- 80	2N697	. . TRANSISTOR V96214 352-0197-00 Q16		1
- 81	2N697	. . TRANSISTOR V96214 352-0197-00 Q1		1
- 82	2N697	. . TRANSISTOR V96214 352-0197-00 Q2		1
- 83	2N697	. . TRANSISTOR V96214 352-0197-00 Q3		1
- 84	2N697	. . TRANSISTOR V96214 352-0197-00 Q5		1
- 85	2N697	. . TRANSISTOR V96214 352-0197-00 Q4		1
- 86	2N697	. . TRANSISTOR V96214 352-0197-00 Q24		1
- 87	2N697	. . TRANSISTOR V96214 352-0197-00 Q17		1
- 88	2N697	. . TRANSISTOR V96214 352-0197-00 Q25		1
- 89	2N697	. . TRANSISTOR V96214 352-0197-00 Q18		1
- 90	1101A	. . MOUNTING, TSTR V07896 352-9814-00 XQ4, XQ5, XQ17, XQ18, XQ24, XQ25		6
		ATTACHING PARTS		
	AN345B10	. . NUT, PLAIN, HEX. V77250 313-0056-00		6
	MS35338-81	. . WASHER, LOCK V79807 310-0284-00		6
	COML	. . WASHER, FLAT 310-0060-00		6
	IMC140	. . INSULATOR, WASH. V10583 302-0410-00		12
	548-9539-002	. . WASHER		6
		- - * - -		
- 91	RC07GF680K	. . RESISTOR, FXD, 68 OHMS 10%, 1/4 W V01121 745-0707-00 R88		1
- 92	RC07GF680K	. . RESISTOR, FXD, 68 OHMS 10%, 1/4 W V01121 745-0707-00 R14		1
- 93	RC07GF680K	. . RESISTOR, FXD, 68 OHMS 10%, 1/4 W V01121 745-0707-00 R13		1
- 94	RC07GF680K	. . RESISTOR, FXD, 68 OHMS 10%, 1/4 W V01121 745-0707-00 R86		1
- 95	RC07GF680K	. . RESISTOR, FXD, 68 OHMS 10%, 1/4 W V01121 745-0707-00 R125		1
- 96	RC07GF680K	. . RESISTOR, FXD, 68 OHMS 10%, 1/4 W V01121 745-0707-00 R124		1
- 97	RN60B6812F	. . RESISTOR, FXD, 68,000 OHMS 1%, 1/8 W V75042 705-6684-00 R129		1
- 98	151D345X9035X2	. . CAPACITOR, FXD, 3.4 UF 10%, 35 VDCW V56289 184-8364-00 C52		1
- 99	151D345X9035X2	. . CAPACITOR, FXD, 3.4 UF 10%, 35 VDCW V56289 184-8364-00 C30		1

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
6 -100	K68J20S	. . CAPACITOR, FXD, 68 UF 20%, 20 VDCW V05397 184-7665-00 C51		1
-101	K68J20S	. . CAPACITOR, FXD, 68 UF 20%, 20 VDCW V05397 184-7665-00 C29		1
-102	RC07GF223K	. . RESISTOR, FXD, 22,000 OHMS 10%, 1/4 W V01121 745-0797-00 R19		1
-103	RC07GF223K	. . RESISTOR, FXD, 22,000 OHMS 10%, 1/4 W V01121 745-0797-00 R20		1
-104	KR047J35S	. . CAPACITOR, FXD, 47,000 UUF 20%, 35 VDCW V05397 184-7393-00 C6		1
-105	KR047J35S	. . CAPACITOR, FXD, 47,000 UUF 20%, 35 VDCW V05397 184-7393-00 C8		1
-106	KR047J35S	. . CAPACITOR, FXD, 47,000 UUF 20%, 35 VDCW V05397 184-7393-00 C9		1
-107	KR047J35S	. . CAPACITOR, FXD, 47,000 UUF 20%, 35 VDCW V05397 184-7393-00 C7		1
-108	RC07GF150K	. . RESISTOR, FXD, 15 OHMS 10%, 1/4 W V01121 745-0683-00 R18		1
-109	RC07GF150K	. . RESISTOR, FXD, 15 OHMS 10%, 1/4 W V01121 745-0683-00 R17		1
-110	RC20GF272K	. . RESISTOR, FXD, 2700 OHMS 10%, 1/4 W V01121 745-1370-00 R16		1
-111	RC07GF332K	. . RESISTOR, FXD, 3300 OHMS 10%, 1/4 W V01121 745-0767-00 R8		1
-112	RC07GF332K	. . RESISTOR, FXD, 3300 OHMS 10%, 1/4 W V01121 745-0767-00 R9		1
-113	RC07GF332K	. . RESISTOR, FXD, 3300 OHMS 10%, 1/4 W V01121 745-0767-00 R5		1
-114	K1J35S	. . CAPACITOR, FXD, 1 UF 20%, 35 VDCW V05397 184-7398-00 C60		1
-115	RC07GF152K	. . RESISTOR, FXD, 1500 OHMS 10%, 1/4 W V01121 745-0755-00 R21		1
-115A	1N647	. . SEMICONDUCTOR DEVICE, DIO V03877 353-2596-00 CR22		1
-115B	1N647	. . SEMICONDUCTOR DEVICE, DIO V03877 353-2596-00 CR23		1
R -116	RC07GF222K	. . RESISTOR, FXD, 2200 OHMS 10%, 1/4 W V01121 745-0761-00 R6		1
-117	K4R7J35S	. . CAPACITOR, FXD, 4.7 UF 20%, 35 VDCW V05397 184-7396-00 C37		1
-118	K4R7J35S	. . CAPACITOR, FXD, 4.7 UF 20%, 35 VDCW V05397 184-7396-00 C34		1
-119	151D505X9035Y2	. . CAPACITOR, FXD, 5 UF 10%, 35 VDCW V56289 184-8365-00 C53		1
-120	151D505X9035Y2	. . CAPACITOR, FXD, 5 UF 10%, 35 VDCW V56289 184-8365-00 C31		1
-121	K100J10S	. . CAPACITOR, FXD, 100 UF 20%, 10 VDCW V05397 184-7651-00 C35		1
-122	K100J10S	. . CAPACITOR, FXD, 100 UF 20%, 10 VDCW V05397 184-7651-00 C32		1
-123	151D506X0010R2	. . CAPACITOR, FXD, 50 UF 20%, 10 VDCW V56289 184-8289-00 C54		1
-124	K150J15S	. . CAPACITOR, FXD, 150 UF 20%, 15 VDCW V05397 184-7656-00 C4		1
-125	RC07GF562K	. . RESISTOR, FXD, 5600 OHMS 10%, 1/4 W V01121 745-0776-00 R3		1
-126	RC07GF393K	. . RESISTOR, FXD, 39,000 OHMS 10%, 1/4 W V01121 745-0806-00 R22		1
-127	RC07GF472K	. . RESISTOR, FXD, 4700 OHMS 10%, 1/4 W V01121 745-0773-00 R4		1

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
6 -128	RC07GF472K	• • RESISTOR, FXD, 4700 OHMS 10%, 1/4 W V01121 745-0773-00 R10		1
R -129	RC07GF272K	• • RESISTOR, FXD, 2700 OHMS 10%, 1/4 W V01121 745-0764-00 R7		1
-130	RC07GF472K	• • RESISTOR, FXD, 4700 OHMS 10%, 1/4 W V01121 745-0773-00 R15		1
-131	K18J15KS	• • CAPACITOR, FXD, 18 UF 20%, 15 VDCW V05397 184-7654-00 C2		1
-132	RC07GF182K	• • RESISTOR, FXD, 1800 OHMS 10%, 1/4 W V01121 745-0758-00 R11		1
-133	RC07GF152K	• • RESISTOR, FXD, 1500 OHMS 10%, 1/4 W V01121 745-0755-00 R12		1
-134	K1J35S	• • CAPACITOR, FXD, 1 UF 20%, 35 VDCW V05397 184-7393-00 C56		1
-135	118P22492S4	• • CAPACITOR, FXD, 220,000 UUF 10%, 200 VDCW V56289 951-2499-00 C10		1
-136	RC07GF822K	• • RESISTOR, FXD, 8200 OHMS 10%, 1/4 W V01121 745-0782-00 R121		1
-137	RC07GF822K	• • RESISTOR, FXD, 8200 OHMS 10%, 1/4 W V01121 745-0782-00 R84		1
-138	RC07GF822K	• • RESISTOR, FXD, 8200 OHMS 10%, 1/4 W V01121 745-0782-00 R126		1
-139	RC07GF822K	• • RESISTOR, FXD, 8200 OHMS 10%, 1/4 W V01121 745-0782-00 R89		1
-140	RC07GF100K	• • RESISTOR, FXD, 10 OHMS 10%, 1/4 W V01121 745-0677-00 R123		1
-141	RC07GF100K	• • RESISTOR, FXD, 10 OHMS 10%, 1/4 W V01121 745-0677-00 R87		1
-142	AB396-1	• • TERMINAL, STUD V12615 306-1281-00		8
		ATTACHING PARTS		
	MS35216-2	• • SCREW, MACH. V77250 343-0123-00		7
	MS35200-2	• • SCREW, MACH. V77250 342-0132-00		1
	MS35338-77	• • WASHER, LOCK V79807 310-0275-00		8
		- - * - -		
-143	AB396-1	• • TERMINAL, STUD V12615 306-1281-00		1
		ATTACHING PARTS		
	MS35338-77	• • WASHER, LOCK V79807 310-0275-00		1
		- - * - -		
-144	AB397-1	• • TERMINAL, STUD V12615 306-1286-00		1
-145	94-0925-00	• • TRANSFORMER, AF V88063 667-0082-00 T2		1
		ATTACHING PARTS		
	MS35649-44	• • NUT, PLAIN, HEX. V77250 313-0043-00		4
	MS35335-57	• • WASHER, LOCK V78189 373-8010-00		4
	MS35216-12	• • SCREW, MACH. V77250 343-0133-00		4
	4007-4HOT TINNED	• • TERMINAL, LUG V77147 304-0015-00		2
		- - * - -		
-146	D10404	• • TRANSFORMER, AF V70674 667-0085-00 T3		1
		ATTACHING PARTS		
	MS35216-23	• • SCREW, MACH. V77250 343-0167-00		4
	MS35338-79	• • WASHER, LOCK V79807 310-0282-00		4
		- - * - -		
-147	D0T38	• • TRANSFORMER, AF V80223 677-1521-00 T4		1
-148	TXBP032--037-3	• • HOLDER, SEMICONDUCTOR V98978 352-9885-00		1
		ATTACHING PARTS		
	MS35200-11	• • SCREW, MACH. V77250 342-0043-00		1
	MS35335-57	• • WASHER, LOCK V78189 373-8010-00		1
		- - * - -		
-149	553-2345-00	• • WIRING HARNESS, BRANCHED		1

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
6 -150	DB25PC7	. . . CONNECTOR, RECP V91146 371-0170-00 P1		1
		ATTACHING PARTS		
	20418-2	. . . SCREW, ASSEMBLED CLIP V71468 371-0062-00		2
	2104-04-01-2520N	. . . TERMINAL, LUG V78189 304-0317-00		1
		- - * - -		
-151	DB25SC7	. . . CONNECTOR, RECP V71468 371-0221-00 J8		1
-152	553-2384-00	. CHASSIS, ELECTRICAL EQUIP.		1
-153	3307X	. . SOCKET, TSTR V91662 352-9903-00 XQ1 THRU XQ3, XQ16, XQ23		5
		ATTACHING PARTS		
	757	. . RETAINER, TSTR SOC V91662 352-9904-00		5
		- - * - -		
-154	SL174-198	. . TERMINAL, FEEDTHRU V12615 306-1271-00		41
-155	SL173-197	. . TERMINAL, STANDOFF V12615 306-1261-00		40
-156	RFTSM71L2	. . TERMINAL, FEEDTHRU V12615 306-1296-00		5
-157	553-2382-005	. . CHASSIS, ELECTRICAL EQUIP.		1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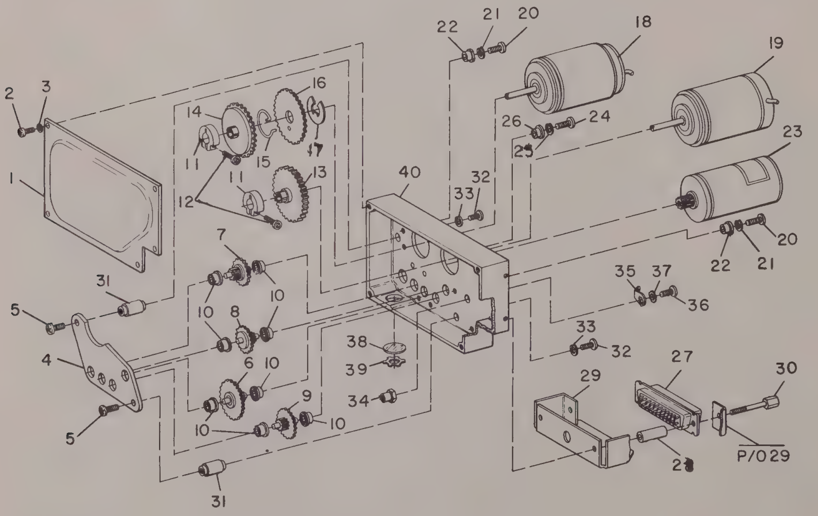
Radio Magnetic Indicator Electronic Control Amplifier
Figure 7

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
7 -	553-2343-00	RADIO MAGNETIC INDICATOR ELECTRONIC CONTROL AMPLIFIER SEE FIG. 6-3 FOR NHA		REF
- 1	2N697	• TRANSISTOR V96214 352-0197-00 Q6		1
- 2	2N697	• TRANSISTOR V96214 352-0197-00 Q7		1
- 3	2N697	• TRANSISTOR V96214 352-0197-00 Q9		1
- 4	2N697	• TRANSISTOR V96214 352-0197-00 Q8		1
- 5	RC07GF472K	• RESISTOR, FXD, 4700 OHMS 10%, 1/4 W V01121 745-0773-00 R27		1
- 6	RC07GF472K	• RESISTOR, FXD, 4700 OHMS 10%, 1/4 W V01121 745-0773-00 R24		1
- 7	RW69V331	• RESISTOR, FXD, 330 OHMS 5%, 3 W V91637 747-5388-00 R33		1
- 8	RC07GF150K	• RESISTOR, FXD, 15 OHMS 10%, 1/4 W V01121 745-0683-00 R31		1
- 9	RC07GF150K	• RESISTOR, FXD, 15 OHMS 10%, 1/4 W V01121 745-0683-00 R32		1
- 10	KR047J35S	• CAPACITOR, FXD, 47,000 UUF 20%, 35 VDCW V05397 184-7393-00 C13		1
- 11	KR047J35S	• CAPACITOR, FXD, 47,000 UUF 20%, 35 VDCW V05397 184-7393-00 C11		1
- 12	KR047J35S	• CAPACITOR, FXD, 47,000 UUF 20%, 35 VDCW V05397 184-7393-00 C12		1
- 13	KR047J35S	• CAPACITOR, FXD, 47,000 UUF 20%, 35 VDCW V05397 184-7393-00 C14		1
- 14	RC07GF822K	• RESISTOR, FXD, 8200 OHMS 10%, 1/4 W V01121 745-0782-00 R34		1
- 15	SDB1K01473M	• CAPACITOR, FXD, 47,000 UUF 20%, 100 VDCW V53021 931-4486-00 C15		1
- 16	151D115X9020 W2	• CAPACITOR, FXD, 1.1 UF 10%, 20 VDCW V05397 184-8363-00 C16		1
- 17	K2R2J35KS	• CAPACITOR, FXD, 2.2 UF 10%, 35 VDCW V05397 184-7704-00 C17		1
- 18	RC07GF391K	• RESISTOR, FXD, 390 OHMS 10%, 1/4 W V01121 745-0734-00 R35		1
- 19	RC07GF391K	• RESISTOR, FXD, 390 OHMS 10%, 1/4 W V01121 745-0734-00 R23		1
- 20	RC07GF100K	• RESISTOR, FXD, 10 OHMS 10%, 1/4 W V01121 745-0677-00 R36A		1
- 21	RC07GF100K	• RESISTOR, FXD, 10 OHMS 10%, 1/4 W V01121 745-0677-00 R36B		1
- 22	DOT39	• TRANSFORMER, AF V80223 677-1522-00 T6		1
- 23	TXBP032-037-3	• HOLDER, SEMICONDUCTOR V98978 352-9885-00		1
		ATTACHING PARTS		
	MS35335-57	• WASHER, LOCK V78189 373-8010-00		1
		- - * - -		
- 24	RC07GF680K	• RESISTOR, FXD, 68 OHMS 10%, 1/4 W V01121 745-0707-00 R30		1
- 25	RC07GF680K	• RESISTOR, FXD, 68 OHMS 10%, 1/4 W V01121 745-0707-00 R29		1
- 26	RC07GF332K	• RESISTOR, FXD, 3300 OHMS 10%, 1/4 W V01121 745-0767-00 R26		1
- 27	RC07GF332K	• RESISTOR, FXD, 3300 OHMS 10%, 1/4 W V01121 745-0767-00 R25		1
- 28	DOT38	• TRANSFORMER, AF V80223 677-1521-00 T5		1
- 29	TXBP032-037-3	• HOLDER, SEMICONDUCTOR V98978 352-9885-00		1
		ATTACHING PARTS		
	MS35335-57	• WASHER, LOCK V78189 373-8010-00		1
		- - * - -		

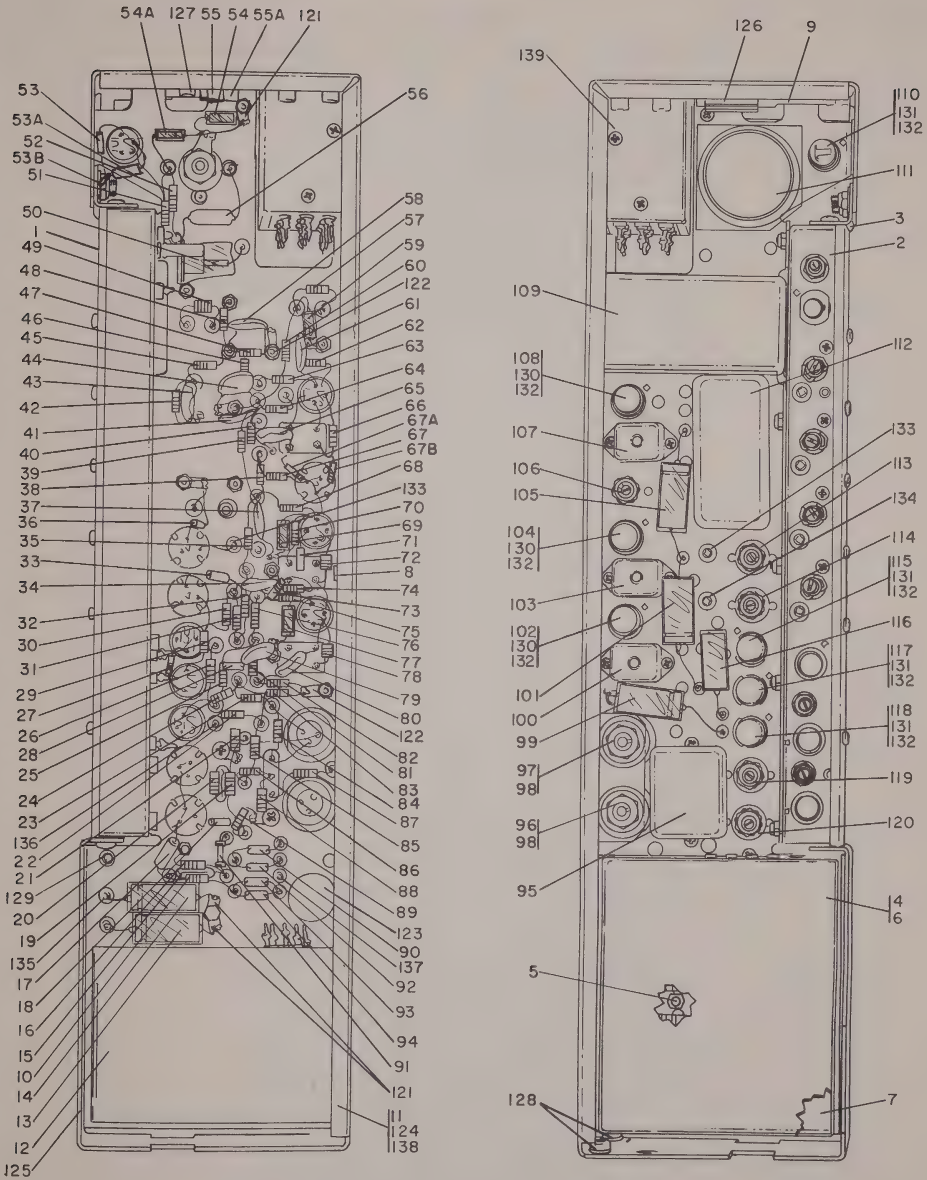
FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
7 - 30	RC07GF182K	. RESISTOR, FXD, 1800 OHMS 10%, 1/4 W V01121 745-0758-00 R28		1
- 31	1N1897R	. SEMICONDUCTOR DEVICE, DIO V06751 353-1489-00 CR3		1
- 32	4007-4HOT TINNED	. TERMINAL, LUG V77147 304-0015-00		2
		ATTACHING PARTS		
	MS35649-44	. NUT, PLAIN, HEX. V77250 313-0043-00		1
	MS35335-57	. WASHER, LOCK V78189 373-8010-00		1
		- - * - -		
- 33	AB396-1	. TERMINAL, STUD V12615 306-1281-00		1
- 34	553-2374-004	. CHASSIS, ELECTRICAL EQUIP.		1
- 35	3307X	. . SOCKET, TSTR V91662 352-9903-00 XQ6 THRU XQ9		4
		ATTACHING PARTS		
	MS35216-2	. . SCREW, MACH. V77250 343-0123-00		1
	MS35333-69	. . WASHER, LOCK V78189 373-8500-00		1
	757	. . RETAINER, TSTR SOC V91662 352-9904-00		4
		- - * - -		
- 36	FTSM1	. . TERMINAL, FEEDTHRU V98291 306-0323-00		2
- 37	G2621	. . TERMINAL, STUD V12615 306-1100-00		10
- 38	SKT41WHT	. . JACK, TIP V98291 360-0266-00 J6		1
- 39	SKT41WHT	. . JACK, TIP V98291 360-0266-00 J5		1
- 40	SKT41WHT	. . JACK, TIP V98291 360-0266-00 J7		1
- 41	F22NCFMA1-40	. . NUT, SELF-LKG, CLINCH V72962 333-0839-00		4
- 42	553-2373-004	. . CHASSIS, ELECTRICAL EQUIP.		1



Bearing Servomechanism
Figure 8

	FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
	8 -	553-2385-005	BEARING SERVO MECHANISM SEE FIG. 6-5 FOR NHA		REF
	- 1	553-2362-003	. COVER, GEAR HOUSING		1
			ATTACHING PARTS		
	- 2	MS35216-2	. SCREW, MACH. V77250 343-0123-00		5
	- 3	MS35338-77	. WASHER, LOCK V79807 310-0275-00		5
			- - * - -		
	- 4	553-2350-002	. PLATE, GEAR		1
			ATTACHING PARTS		
	- 5	MS35216-11	. SCREW, MACH. V77250 343-0132-00		2
			- - * - -		
	- 6	542-6128-002	. GEAR		1
	- 7	553-2352-002	. GEAR ASSY, SPUR		1
	- 8	542-6124-002	. GEAR		1
	- 9	542-6126-002	. GEAR		1
	- 10	S3FCHHP37L01	. BEARING, BALL, ANNULAR V40920 309-0653-00		8
	- 11	503-4750-001	. CLAMP, LOOP		2
			ATTACHING PARTS		
	- 12	324-0580-00	. SCREW, CAP, SCH		2
			- - * - -		
	- 13	542-6130-002	. GEAR		1
		542-6133-002	. GEAR ASSY, DIFFERENTIAL		1
	- 14	542-6151-003	. . GEAR, DIFFERENTIAL		1
	- 15	542-6132-002	. . SPRING, LOADING		1
	- 16	542-6131-002	. . GEAR		1
	- 17	5133-25C	. . RING, RETAINING V89462 340-0254-00		1
R	- 18	TDC11F4C	. SYNCHRO, DIFFERENTIAL XMTR V86197 229-0151-00 B3 FOR BREAKDOWN SEE COLLINS MANUAL 523-0755772		1
R	- 19	RS931-3E	. SYNCHRO, RESOLVER V88818 229-0110-00 B2 FOR BREAKDOWN SEE COLLINS MANUAL 523-0756258		1
			ATTACHING PARTS FOR 18 AND 19		
	- 20	COML	. SCREW, MACH. 347-0024-00		6
	- 21	MS35338-77	. WASHER, LOCK V79807 310-0275-00		6
	- 22	542-6137-002	. CLAMP, RESOLVER		6
			- - * - -		
R	- 23	ST10017-4	. MOTOR-GENERATOR V03998 229-2007-00 B1 FOR BREAKDOWN SEE COLLINS MANUAL 523-0756404		1
R	- 23	665-55-113	. MOTOR-GENERATOR V72568 229-2008-00 B1 FOR BREAKDOWN SEE COLLINS MANUAL 523-0756479		1
			ATTACHING PARTS		
	- 24	COML	. SCREW, MACH. 347-0024-00		3
	- 25	MS35338-77	. WASHER, LOCK V79807 310-0275-00		3
	- 26	553-2348-002	. CLAMP, RIM CLENCHING		3
			- - * - -		
	- 27	DB25PC7	. CONNECTOR, RECP V91146 371-0170-00 P2		1
	- 28	541-5989-002	. SPACER, SLV		2
	- 29	553-2370-004	. BRACKET, ELECTRICAL CONN		1
			ATTACHING PARTS		
	- 30	553-2349-002	. BOLT		2
			- - * - -		
	- 31	542-6136-002	. SPACER, GEAR PLATE		2
			ATTACHING PARTS		
	- 32	COML	. SCREW, MACH. 343-0143-00		2
	- 33	MS35338-78	. WASHER, LOCK V79807 310-0279-00		2
			- - * - -		

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
8 - 34	553-2356-002	• STUB SHAFT, LKG GEAR		1
- 35	2104-04-01-2520N	• TERMINAL, LUG V78189 304-0317-00		1
		ATTACHING PARTS		
- 36	MS35216-11	• SCREW, MACH. V77250 343-0132-00		1
- 37	MS35335-57	• WASHER, LOCK V78189 373-8010-00		1
		- - * - -		
	553-2381-005	• HOUSING, GEAR		1
- 38	553-2361-002	• • WINDOW, OBSERVATION		1
		ATTACHING PARTS		
- 39	5005-50	• • RING, RETAINING V89462 340-0447-00		1
		- - * - -		
- 40	553-2380-005	• • HOUSING, GEAR		1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51V-4B Glide Slope Radio Receiver
Figure 9

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
9 -	522-3195-00	51V-4B GLIDE SLOPE RADIO RECEIVER SEE FIG. 1-6 FOR NHA		REF
- 1	548-3951-002	. COVER, SHLD		1
		ATTACHING PARTS		
	COML	. SCREW, MACH. 343-0297-00		6
	COML	. WASHER, LOCK 310-0075-00		6
		- - * - -		
- 2	548-3976-005	. RF MIXER-OSCILLATOR-AMPLIFIER SEE FIG. 10		1
		ATTACHING PARTS		
	68-1660-40	. NUT, SELF-LKG, HEX. V72962 333-0605-00		9
	MS35216-11	. SCREW, MACH. V77250 343-0132-00		7
	MS35216-12	. SCREW, MACH. V77250 343-0133-00		2
		- - * - -		
- 3	549-3416-002	. BRACKET, SUPPORT		1
		ATTACHING PARTS		
	68-1660-40	. NUT, SELF-LKG, HEX. V72962 333-0605-00		2
	MS35200-12	. SCREW, MACH. V77250 342-0044-00		2
		- - * - -		
- 4	553-6499-003	. COVER, OSC		1
		ATTACHING PARTS		
	MS35216-12	. SCREW, MACH. V77250 343-0133-00		2
	MS35337-78	. WASHER, LOCK V79807 310-0278-00		2
		- - * - -		
- 5	553-6472-002	. . INSULATOR, SLV		1
		ATTACHING PARTS		
	MS35216-15	. . SCREW, MACH. V77250 343-0136-00		1
		- - * - -		
- 6	553-6498-003	. . COVER, OSC		1
- 7	553-6537-003P	. GLIDE SLOPE OSCILLATOR SUBASSEMBLY SEE FIG. 11		1
- 8	422-04-22-034-113	. STRAP, RETAINING V71785 139-0647-00		1
		ATTACHING PARTS		
	68-1660-40	. NUT, SELF-LKG, HEX. V72962 333-0605-00		1
	MS35200-12	. SCREW, MACH. V77250 342-0044-00		1
		- - * - -		
- 9	548-3952-002	. TUNING TOOL		1
- 10	RC07GF102K	. RESISTOR, FXD, 1000 OHMS 10%, 1/4 W V01121 745-0749-00 R78		1
- 11	548-3945-00	. RECEIVER SUBASSEMBLY, CHASSIS		1
		ATTACHING PARTS		
	MS35200-3	. SCREW, MACH. V77250 342-0133-00		4
		- - * - -		
- 12	60E193	. . FILTER, BAND PASS V59446 673-0823-00 FL3		1
		ATTACHING PARTS		
	68-1660-40	. . NUT, SELF-LKG, HEX. V72962 333-0605-00		2
	540-9044-003	. . POST, ELECTRICAL-MECHANICAL EQUIP.		2
		- - * - -		
- 13	K150J15S	. . CAPACITOR, FXD, 150 UF 20%, 15 VDCW V05397 184-7656-00 C46		1
- 14	K150J15S	. . CAPACITOR, FXD, 150 UF 20%, 15 VDCW V05397 184-7656-00 C45		1
- 15	RN60B4220F	. . RESISTOR, FXD, 422 OHMS 1%, 1/8 W V75042 705-6578-00 R76		1
- 16	RC07GF470K	. . RESISTOR, FXD, 47 OHMS 10%, 1/4 W V01121 745-0701-00 R74		1
- 17	RN60B4220F	. . RESISTOR, FXD, 422 OHMS 1%, 1/8 W V75042 705-6578-00 R75		1
- 18	1N457	. . SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR21		1

FIG.-ITEM	PART NO.	1 2 3 4 5 6 7 NOMENCLATURE	USAGE CODE	UNITS PER ASSY.
9 - 19	RC07GF150K	• • RESISTOR, FXD, 15 OHMS 10%, 1/4 W V01121 745-0683-00 R69		1
- 20	RC07GF272K	• • RESISTOR, FXD, 2700 OHMS 10%, 1/4 W V01121 745-0764-00 R63		1
- 21	RC07GF470K	• • RESISTOR, FXD, 47 OHMS 10%, 1/4 W V01121 745-0701-00 R67		1
- 22	RC07GF332J	• • RESISTOR, FXD, 3300 OHMS 5%, 1/4 W V01121 745-0766-00 R59		1
- 22	RC07GF562K	• • RESISTOR, FXD, 5600 OHMS 10%, 1/4 W V01121 745-0776-00 R59 SB-24		1
- 23	RC07GF182K	• • RESISTOR, FXD, 1800 OHMS 10%, 1/4 W V01121 745-0758-00 R61		1
- 24	RC07GF121K	• • RESISTOR, FXD, 120 OHMS 10%, 1/4 W V01121 745-0716-00 R60		1
- 25	RC07GF332K	• • RESISTOR, FXD, 3300 OHMS 10%, 1/4 W V01121 745-0767-00 R55		1
- 26	RC07GF332K	• • RESISTOR, FXD, 3300 OHMS 10%, 1/4 W V01121 745-0767-00 R57		1
- 27	RC07GF332K	• • RESISTOR, FXD, 3300 OHMS 10%, 1/4 W V01121 745-0767-00 R53		1
- 28	1N270	• • SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR15		1
- 29	RC07GF271K	• • RESISTOR, FXD, 270 OHMS 10%, 1/4 W V01121 745-0728-00 R50		1
- 30	RC07GF561K	• • RESISTOR, FXD, 560 OHMS 10%, 1/4 W V01121 745-0740-00 R85		1
- 31	RC07GF332K	• • RESISTOR, FXD, 3300 OHMS 10%, 1/4 W V01121 745-0767-00 R52		1
- 32	RC07GF220K	• • RESISTOR, FXD, 22 OHMS 10%, 1/4 W V01121 745-0689-00 R47		1
- 33	1-4M6-2AZ5	• • SEMICONDUCTOR DEVICE, DIO V04713 353-3204-00 CR16		1
- 34	815501X5G 0203P	• • CAPACITOR, FXD, 20,000 UUF +80-20%, 100 VDCW V72982 913-3678-00 C39		1
- 35	RC07GF220K	• • RESISTOR, FXD, 22 OHMS 10%, 1/4 W V01121 745-0689-00 R43		1
R - 36	RC07GF472K	• • RESISTOR, FXD, 4700 OHMS 10%, 1/4 W V01121 745-0773-00 R58 SB-24		1
- 37	815501X5G 0203P	• • CAPACITOR, FXD, 20,000 UUF +80-20%, 100 VDCW V72982 913-3678-00 C35		1
- 38	RC07GF392K	• • RESISTOR, FXD, 3900 OHMS 10%, 1/4 W V01121 745-0770-00 R42		1
- 39	RC07GF470K	• • RESISTOR, FXD, 47 OHMS 10%, 1/4 W V01121 745-0701-00 R36		1
- 40	RC07GF470K	• • RESISTOR, FXD, 47 OHMS 10%, 1/4 W V01121 745-0701-00 R37		1
- 41	815501X5G 0203P	• • CAPACITOR, FXD, 20,000 UUF +80-20%, 100 VDCW V72982 913-3678-00 C31		1
- 42	RC07GF103K	• • RESISTOR, FXD, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 R27		1
- 43	815501X5G 0203P	• • CAPACITOR, FXD, 20,000 UUF +80-20%, 100 VDCW V72982 913-3678-00 C22		1
- 44	815501X5G 0203P	• • CAPACITOR, FXD, 20,000 UUF +80-20%, 100 VDCW V72982 913-3678-00 C30		1
- 45	RC07GF222K	• • RESISTOR, FXD, 2200 OHMS 10%, 1/4 W V01121 745-0761-00 R28		1
- 46	RC07GF470K	• • RESISTOR, FXD, 47 OHMS 10%, 1/4 W V01121 745-0701-00 R32		1
- 47	RC07GF470K	• • RESISTOR, FXD, 47 OHMS 10%, 1/4 W V01121 745-0701-00 R25		1
- 48	RC07GF102K	• • RESISTOR, FXD, 1000 OHMS 10%, 1/4 W V01121 745-0749-00 R29		1

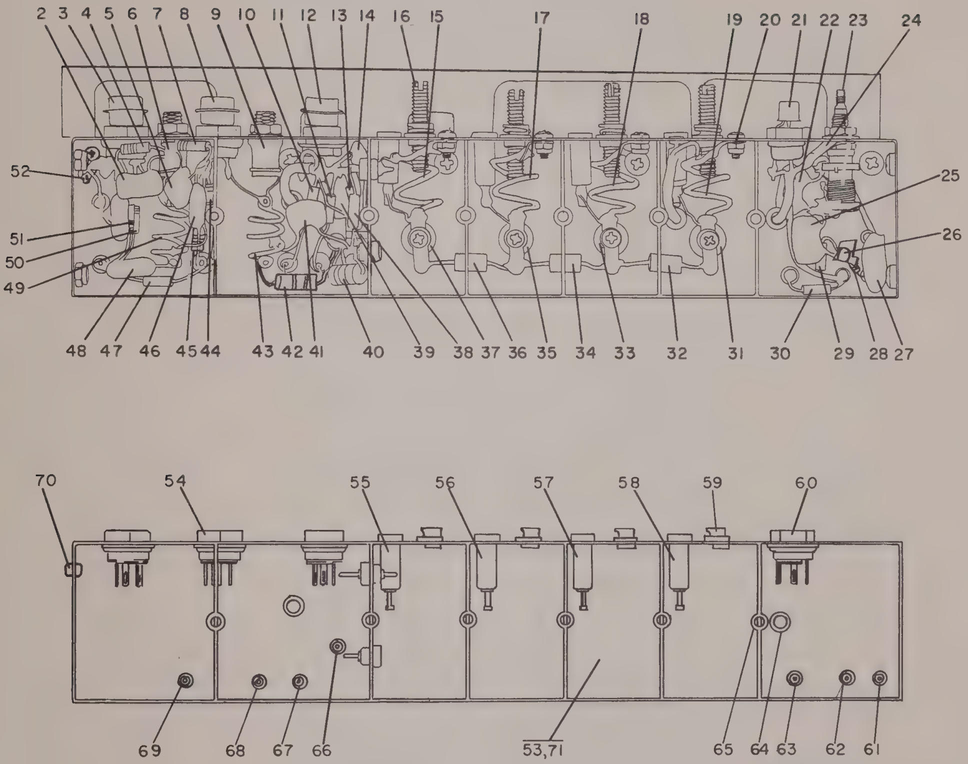
FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
9 - 49	GA6-2UUFPORM 5PCT	. . CAPACITOR, FXD, 6.2 UUF 5%, 500 VDCW V78488 913-2995-00 C70		1
- 50	1N3255	. . SEMICONDUCTOR DEVICE, DIO V49671 353-3276-00 CR23		1
- 51	RC07GF272K	. . RESISTOR, FXD, 2700 OHMS 10%, 1/4 W V01121 745-0764-00 R84		1
- 52	RC07GF271K	. . RESISTOR, FXD, 270 OHMS 10%, 1/4 W V01121 745-0728-00 R83		1
- 53	4M17Z5	. . SEMICONDUCTOR DEVICE, DIO V04713 353-3232-00 CR22		1
- 53A	K4R7J35S	. . CAPACITOR, FXD, 4.7 UF 20%, 35 VDCW V05397 184-7396-00 C87		1
- 53B	SPL4040-4HOT TINNED	. . TERMINAL, LUG V77147 304-0332-00		1
		ATTACHING PARTS		
	68-1660-40	. . NUT, SELF-LKG, HEX. V72962 333-0605-00		1
	MS35200-12	. . SCREW, MACH. V77250 342-0044-00		1
		- - * - -		
- 54	K4R7J35S	. . CAPACITOR, FXD, 4.7 UF 20%, 35 VDCW V05397 184-7396-00 C71		1
- 54A	CL35BQOR5MP3	. . CAPACITOR, FXD, 500,000 UUF 20%, 150 VDCW V56289 184-8071-00 C86		1
- 55	MS25281-7P	. . CLAMP, LOOP V09922 150-1543-00		1
		ATTACHING PARTS		
	68-1660-40	. . NUT, SELF-LKG, HEX. V72962 333-0605-00		1
	502-1515-002	. . WASHER		1
	MS35200-14	. . SCREW, MACH. V77250 342-0046-00		1
		- - * - -		
- 55A	CL25BN250UP3	. . CAPACITOR, FXD, 25 UF 75-15%, 100 VDCW V56289 184-8027-00 C21		1
- 56	RW69V100	. . RESISTOR, FXD, 10 OHMS 5%, 3 W V91637 747-5320-00 R82		1
- 57	RC07GF331K	. . RESISTOR, FXD, 330 OHMS 10%, 1/4 W V01121 745-0731-00 R81		1
- 58	815501X5G 0203P	. . CAPACITOR, FXD, 20,000 UUF +80-20%, 100 VDCW V72982 913-3678-00 C26		1
- 59	KR47J35KS	. . CAPACITOR, FXD, 470,000 UUF 10%, 35 VDCW V05397 184-7708-00 C27		1
- 60	RC07GF101K	. . RESISTOR, FXD, 100 OHMS 10%, 1/4 W V01121 745-0713-00 R33		1
- 61	815501X5G 0203P	. . CAPACITOR, FXD, 20,000 UUF +80-20%, 100 VDCW V72982 913-3678-00 C28		1
- 62	RC07GF822K	. . RESISTOR, FXD, 8200 OHMS 10%, 1/4 W V01121 745-0782-00 R35		1
- 63	RC07GF272K	. . RESISTOR, FXD, 2700 OHMS 10%, 1/4 W V01121 745-0764-00 R34		1
- 64	RC07GF470K	. . RESISTOR, FXD, 47 OHMS 10%, 1/4 W V01121 745-0701-00 R26		1
- 65	815501X5G 0203P	. . CAPACITOR, FXD, 20,000 UUF +80-20%, 100 VDCW V72982 913-3678-00 C32		1
- 66	GA10-0UUF PORM5PCT	. . CAPACITOR, FXD, 10 UUF 5%, 500 VDCW V78488 913-30000-00 C29		1
- 67	RC07GF101K	. . RESISTOR, FXD, 100 OHMS 10%, 1/4 W V01121 745-0713-00 R39		1
- 67A	RC07GF101K	. . RESISTOR, FXD, 100 OHMS 10%, 1/4 W V01121 745-0713-00 R97		1
- 67B	RC07GF101K	. . RESISTOR, FXD, 100 OHMS 10%, 1/4 W V01121 745-0713-00 R98		1
- 68	RC07GF272K	. . RESISTOR, FXD, 2700 OHMS 10%, 1/4 W V01121 745-0764-00 R40		1

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
9 - 69	KR47J35KS	. . CAPACITOR, FXD, 470,000 UUF 10%, 35 VDCW V05397 184-7708-00 C33		1
- 70	RC07GF822K	. . RESISTOR, FXD, 8200 OHMS 10%, 1/4 W V01121 745-0782-00 R41		1
- 71	RC07GF822K	. . RESISTOR, FXD, 8200 OHMS 10%, 1/4 W V01121 745-0782-00 R44		1
- 72	GA10-0UUF PORM5PCT	. . CAPACITOR, FXD, 10 UUF 5%, 500 VDCW V78488 913-3000-00 C34		1
- 73	815501X5G 0203P	. . CAPACITOR, FXD, 20,000 UUF +80-20%, 100 VDCW V72982 913-3678-00 C36		1
- 74	RC07GF472K	. . RESISTOR, FXD, 4700 OHMS 10%, 1/4 W V01121 745-0773-00 R45		1
- 75	RC07GF182K	. . RESISTOR, FXD, 1800 OHMS 10%, 1/4 W V01121 745-0758-00 R46		1
- 76	RC07GF220K	. . RESISTOR, FXD, 22 OHMS 10%, 1/4 W V01121 745-0689-00 R56		1
- 77	KR47J35KS	. . CAPACITOR, FXD, 470,000 UUF 10%, 35 VDCW V05397 184-7708-00 C37		1
- 78	GA10-0UUF PORM5PCT	. . CAPACITOR, FXD, 10 UUF 5%, 500 VDCW V78488 913-3000-00 C38		1
- 79	815501X5G 0203P	. . CAPACITOR, FXD, 20,000 UUF +80-20%, 100 VDCW V72982 913-3678-00 C42		1
- 80	CM05E680J03	. . CAPACITOR, FXD, 68 UUF 5%, 500 VDCW V72136 912-2804-00 C40		1
- 81	RC07GF153K	. . RESISTOR, FXD, 15,000 OHMS 10%, 1/4 W V01121 745-0791-00 R48		1
- 82	RC07GF122K	. . RESISTOR, FXD, 1200 OHMS 10%, 1/4 W V01121 745-0752-00 R49		1
- 83	RC07GF682K	. . RESISTOR, FXD, 6800 OHMS 10%, 1/4 W V01121 745-0779-00 R62		1
- 84	RC07GF103K	. . RESISTOR, FXD, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 R70		1
- 85	RC07GF390K	. . RESISTOR, FXD, 39 OHMS 10%, 1/4 W V01121 745-0698-00 R64		1
- 86	RC07GF221K	. . RESISTOR, FXD, 220 OHMS 10%, 1/4 W V01121 745-0725-00 R65		1
- 87	RC07GF103K	. . RESISTOR, FXD, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 R71		1
- 88	RC07GF392K	. . RESISTOR, FXD, 3900 OHMS 10%, 1/4 W V01121 745-0770-00 R66		1
- 89	RC07GF470K	. . RESISTOR, FXD, 47 OHMS 10%, 1/4 W V01121 745-0701-00 R68		1
- 90	1N270	. . SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR20		1
- 91	997F18	. . RESISTOR, THRM, 1000 OHMS 10%, 0.5 W V10646 714-1724-00 RT1		1
- 92	1N270	. . SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR19		1
- 93	1N270	. . SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR18		1
- 94	1N270	. . SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR17		1
- 95	A12565	. . TRANSFORMER, AF V70674 667-0053-00 T4		1
		ATTACHING PARTS		
	MS35216-11	. . SCREW, MACH. V77250 343-0132-00		2
	MS35338-78	. . WASHER, LOCK V79807 310-0279-00		2
	SPL4040-4HOT TINNED	. . TERMINAL, LUG V77147 304-0332-00		2
		- - * - -		

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
9 - 96	2N697	. . TRANSISTOR V96214 352-0197-00 Q11		1
- 97	2N697	. . TRANSISTOR V96214 352-0197-00 Q10		1
- 98	1101A	. . MOUNTING, TSTR V07896 352-9814-00 XQ10, XQ11		2
		ATTACHING PARTS FOR 96 THRU 98		
	AN345B10	. . NUT, PLAIN, HEX. V77250 313-0056-00		2
	COML	. . WASHER, FLAT 310-0060-00		2
	548-9539-003	. . WASHER		1
	IMC140	. . INSULATOR, WASH. V10583 302-0410-00		4
		- - * - -		
- 99	K150J15S	. . CAPACITOR, FXD, 150 UF 20%, 15 VDCW V05397 184-7656-00 C43		1
-100	X421-1	. . TRANSFORMER, I-F V81815 278-0660-00 T3		1
		ATTACHING PARTS		
	68-1660-26	. . NUT, SELF-LKG, HEX. V72962 333-0604-00		2
	COML	. . WASHER, FLAT 310-6320-00		1
	SPL4040-2HOT TINNED	. . TERMINAL, 61G V77147 304-0331-00		1
	COML	. . SCREW, MACH. 347-0022-00		2
		- - * - -		
-101	K150J15S	. . CAPACITOR, FXD, 150 UF 20%, 15 VDCW V05397 184-7656-00 C47		1
-102	2N1285	. . TRANSISTOR V73445 352-0243-00 Q6		1
-103	X421-1	. . TRANSFORMER, I-F V81815 278-0660-00 T2		1
		ATTACHING PARTS		
	68-1660-26	. . NUT, SELF-LKG, HEX. V72962 333-0604-00		2
	COML	. . WASHER, FLAT 310-6320-00		1
	SPL4040-2HOT TINNED	. . TERMINAL, LUG V77147 304-0331-00		2
	COML	. . SCREW, MACH. 347-0022-00		2
		- - * - -		
-104	2N1285 '	. . TRANSISTOR V73445 352-0243-00 Q5		1
-105	K150J15S	. . CAPACITOR, FXD, 150 UF 20%, 15 VDCW V05397 184-7656-00 C41		1
-106	BJ24248	. . RESISTOR, VAR, 250 OHMS 20%, 1/2 W V71450 380-1667-00 R38		1
		ATTACHING PARTS		
	COML	. . NUT, PLAIN, HEX. 334-0271-00		1
	1914-05-00-2480	. . WASHER, LOCK V78189 373-0035-00		1
		- - * - -		
-107	X421-1	. . TRANSFORMER, I-F V81815 278-0660-00 T1		1
		ATTACHING PARTS		
	68-1660-26	. . NUT, SELF-LKG, HEX. V72962 333-0604-00		2
	COML	. . WASHER, FLAT 310-6320-00		1
	SPL4040-2HOT TINNED	. . TERMINAL, LUG V77147 304-0331-00		1
	COML	. . SCREW, MACH. 347-0022-00		2
		- - * - -		
-108	2N1285	. . TRANSISTOR V73445 352-0243-00 Q4		1
-109	X332-2	. . FILTER, BAND PASS V81815 241-0375-00 FL2		1
		ATTACHING PARTS		
	68-1660-40	. . NUT, SELF-LKG, HEX. V72962 333-0605-00		2
	SPL4040-4HOT TINNED	. . TERMINAL, LUG V77147 304-0332-00		1
		- - * - -		

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
9 -110	2N341	• • TRANSISTOR V96214 352-0153-00 Q13		1
-111	2N174	• • TRANSISTOR V04713 352-0304-00 Q12		1
		ATTACHING PARTS		
	548-9539-003	• • WASHER		1
		- - * - -		
-112	406-1	• • FILTER, BAND PASS V81815 241-0374-00		1
		FL1		
		ATTACHING PARTS		
	68-1660-40	• • NUT, SELF-LKG, HEX. V72962 333-0605-00		4
	SPL4040-4HOT TINNED	• • TERMINAL, LUG V77147 304-0332-00		3
		- - * - -		
-113	BJ24238	• • RESISTOR, VAR, 10,000 OHMS 20%, 1/2 W		1
		V71450 380-1657-00 R54		
		ATTACHING PARTS		
	COML	• • NUT, PLAIN, HEX. 334-0271-00		1
	1914-05-00-2480	• • WASHER, LOCK V78189 373-0035-00		1
		- - * - -		
-114	BJ24248	• • RESISTOR, VAR, 250 OHMS 20%, 1/2 W		1
		V71450 380-1667-00 R51		
		ATTACHING PARTS		
	COML	• • NUT, PLAIN, HEX. 334-0271-00		1
	1914-05-00-2480	• • WASHER, LOCK V78189 373-0035-00		1
		- - * - -		
-115	2N333	• • TRANSISTOR V96214 352-0064-00 Q8		1
-116	K47J20S	• • CAPACITOR, FXD, 47 UF 20%, 20 VDCW		1
		V05397 184-7664-00 C44		
-117	2N333	• • TRANSISTOR V96214 352-0064-00 Q7		1
-118	2N525	• • TRANSISTOR V96214 352-0094-00 Q9		1
-119	BJ24243	• • RESISTOR, VAR, 100 OHMS 20%, 1/2 W		1
		V71450 380-1662-00 R73		
		ATTACHING PARTS		
	COML	• • NUT, PLAIN, HEX. 334-0271-00		1
	1914-05-00-2480	• • WASHER, LOCK V78189 373-0035-00		1
		- - * - -		
-120	BJ24240	• • RESISTOR, VAR, 1000 OHMS 20%, 1/2 W		1
		V71450 380-1659-00 R77		
		ATTACHING PARTS		
	COML	• • NUT, PLAIN, HEX. 334-0271-00		1
	1914-05-00-2480	• • WASHER, LOCK V78189 373-0035-00		1
		- - * - -		
-121	SPL4040-2HOT TINNED	• • TERMINAL, LUG V77147 304-0331-00		5
		ATTACHING PARTS		
	68-1660-26	• • NUT, SELF-LKG, HEX. V72962 333-0604-00		3
	MS35216-3	• • SCREW, MACH. V77250 343-0124-00		2
	COML	• • SCREW, MACH. 330-2285-00		1
		- - * - -		
-122	G4777-10	• • TERMINAL, STUD V12615 306-1018-00		7
		ATTACHING PARTS		
	MS35200-1	• • SCREW, MACH. V77250 342-0131-00		6
	COML	• • SCREW, MACH. 330-2284-00		1
	MS35338-77	• • WASHER, LOCK V79807 310-0275-00		1
	SPL4040-2HOT TINNED	• • TERMINAL, LUG V77147 304-0331-00		1
		- - * - -		

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
9 -123	905-45-55	• • GROMMET, RUB. V75543 201-1060-00		1
-124	548-3973-004	• • CHASSIS, ELECTRICAL EQUIP.		1
-125	280-1998-00	• • • DECAL		1
-126	100-200-2-0	• • • CLIP, SPG TENS V99378 139-0744-00		1
		ATTACHING PARTS		
	COML	• • • RIVET, TUBULAR 305-0043-00		2
		- - * - -		
-127	RM52LHTA51-62	• • • NUT, SELF-LKG, PLATE V72962 333-1107-00		1
		ATTACHING PARTS		
	MS20426AD3-3	• • • RIVET, SOLID V12014 305-1361-00		2
		- - * - -		
-128	F12NCFMA1-62	• • • NUT, SELF-LKG, CLINCH V72962 333-0839-00		2
-129	F22NCFMA1-40	• • • NUT, SELF-LKG, CLINCH V72962 333-0839-00		1
-130	3307	• • • SOCKET, TSTR V91662 352-9902-00 XQ4 THRU XQ6		3
-131	3307X	• • • SOCKET, TSTR V91662 352-9903-00 XQ7 THRU XQ9, XQ13		4
-132	757	• • • RETAINER, TSTR SOC V91662 352-9904-00		7
-133	CN401F80BWHT	• • • JACK, TIP V87739 360-0090-00 J5		1
-134	CN401F80BWHT	• • • JACK, TIP V87739 360-0090-00 J6		1
-135	SL173-197	• • • TERMINAL, STANDOFF V12615 306-1261-00		19
-136	SL174-198	• • • TERMINAL, FEEDTHRU V12615 306-1271-00		6
-137	G2621	• • • TERMINAL, STUD V12615 306-1100-00		8
-138	548-3972-004	• • • CHASSIS, ELECTRICAL EQUIP.		1
-139	548-3947-00	• WIRING HARNESS SEE FIG. 12		1
		ATTACHING PARTS		
	MS35200-3	• SCREW, MACH. V77250 342-0133-00		4
		- - * - -		
10 -	548-3976-005	RF MIXER-OSCILLATOR-AMPLIFIER SEE FIG. 9-2 FOR NHA		REF
- 1	CM05F221J03	• CAPACITOR, FXD, 220 UUF 5%, 500 VDCW V72136 912-2840-00 C48		1
- 2	DM15C150J01	• CAPACITOR, FXD, 15 UUF 5%, 500 VDCW V72136 912-2759-00 C67		1
- 3	2N2398	• TRANSISTOR V87216 352-0406-00 Q14		1
- 4	RC07GF123K	• RESISTOR, FXD, 12,000 OHMS 10%, 1/4 W V01121 745-0788-00 R89		1
- 5	DM15C150J01	• CAPACITOR, FXD, 15 UUF 5%, 500 VDCW V72136 912-2759-00 C18		1
R - 6	VC21G	• CAPACITOR, VAR, 0.8 TO 8.5 UUF, 100 VDCW V73899 922-0415-00 C15		1
- 7	RC07GF123K	• RESISTOR, FXD, 12,000 OHMS 10%, 1/4 W V01121 745-0788-00 R88		1
- 8	2N2398	• TRANSISTOR V87216 352-0406-00 Q15		1
- 9	VC21G	• CAPACITOR, VAR, 0.8 TO 8.5 UUF, 100 VDCW V73899 922-0415-00 C17		1
- 10	RC07GF561K	• RESISTOR, FXD, 560 OHMS 10%, 1/4 W V01121 745-0740-00 R22		1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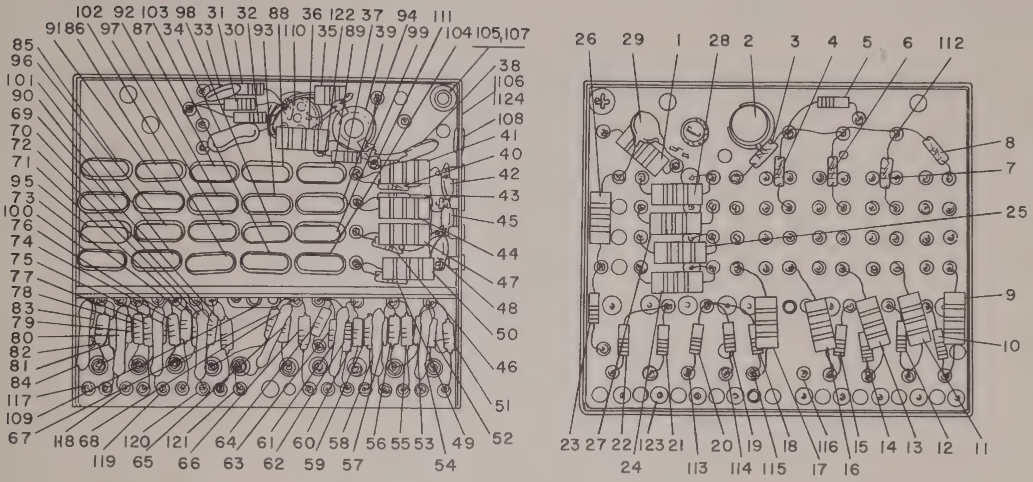
R-F Amplifier Oscillator Mixer
Figure 10

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
10 - 11	RC07GF272K	• RESISTOR, FXD, 2700 OHMS 10%, 1/4 W V01121 745-0764-00 R23		1
- 12	2N2398	• TRANSISTOR V87216 352-0406-00 Q2		1
- 13	RC07GF822K	• RESISTOR, FXD, 8200 OHMS 10%, 1/4 W V01121 745-0782-00 R24 EFF THRU MCN 83		1
- 13	RC07GF682K	• RESISTOR, FXD, 6800 OHMS 10%, 1/4 W V01121 745-0779-00 R24 EFF MCN 84		1
R - 14	855502X5G 0103P	• CAPACITOR, FXD, 10,000 UUF +80-20%, 100 VDCW V72982 913-3680-00 C10		1
- 15	548-3960-002	• COIL, RF L4		1
- 16	503-4934-001	• CORE, ADJUSTABLE TUN		4
		ATTACHING PARTS		
	502-6005-002	• CLIP, RETAINING		4
		- - * - -		
- 17	548-3960-002	• COIL, RF L3		1
- 18	548-3960-002	• COIL, RF L2		1
- 19	548-3960-002	• COIL, RF L1		1
- 20	SPL4040-2HOT TINNED	• TERMINAL, LUG V77147 304-0331-00		4
		ATTACHING PARTS		
	68-1660-26	• NUT, SELF-LKG, HEX. V72962 333-0604-00		4
	MS35216-2	• SCREW, MACH. V77250 343-0123-00		4
		- - * - -		
- 21	2N741A	• TRANSISTOR V04317 352-0342-00 Q3		1
R - 22	CM05E360J03	• CAPACITOR, FXD, 36 UUF 5%, 500 VDCW V72136 912-2783-00 C24 SB-24		1
- 23	548-3958-002	• COIL, OSC L25		1
- 24	4007-8HOT TINNED	• TERMINAL, LUG V77147 304-0017-00		1
- 25	CM05E470J03	• CAPACITOR, FXD, 47 UUF 5%, 500 VDCW V72136 912-2792-00 C23		1
- 26	290-4465-00	• CRYSTAL UNIT, QTZ Y21		1
- 27	CK62AW472M	• CAPACITOR, FXD, 4700 UUF 20%, 500 VDCW V01939 913-1187-00 C25		1
- 28	RC07GF102K	• RESISTOR, FXD, 1000 OHMS 10%, 1/4 W V01121 745-0749-00 R90		1
- 29	RC07GF272K	• RESISTOR, FXD, 2700 OHMS 10%, 1/4 W V01121 745-0764-00 R30		1
- 30	RC07GF182K	• RESISTOR, FXD, 1800 OHMS 10%, 1/4 W V01121 745-0758-00 R31		1
- 31	DA855-013	• CAPACITOR, FXD, 5 UUF 1%, 5000 VDCW V71590 913-0104-00 C1		1
		ATTACHING PARTS		
	MS35216-1	• SCREW, MACH. V77250 343-0122-00		2
	MS35338-77	• WASHER, LOCK V79807 310-0275-00		2
	SPL4040-2HOT TINNED	• TERMINAL, LUG V77147 304-0331-00		2
		- - * - -		
- 32	GA-27UUFPORM 5PCT	• CAPACITOR, FXD, 0.27 UUF 5%, 500 VDCW V78488 913-2970-00 C2		1
- 33	DA855-013	• CAPACITOR, FXD, 5 UUF 1%, 5000 VDCW V71590 913-0104-00 C3		1
		ATTACHING PARTS		
	MS35216-1	• SCREW, MACH. V77250 343-0122-00		2
	MS35338-77	• WASHER, LOCK V79807 310-0275-00		2
	SPL4040-2HOT TINNED	• TERMINAL, LUG V77147 304-0331-00		2
		- - * - -		
- 34	GA-27UUFPORM 5PCT	• CAPACITOR, FXD, 0.27 UUF 5%, 500 VDCW V78488 913-2970-00 C4		1

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
10 - 35	DA855-013	• CAPACITOR, FXD, 5 UUF 1%, 5000 VDCW V71590 913-0104-00 C5		1
		ATTACHING PARTS		
	MS35216-1	• SCREW, MACH. V77250 343-0122-00		2
	MS35338-77	• WASHER, LOCK V79807 310-0275-00		2
	SPL4040-2HOT TINNED	• TERMINAL, LUG V77147 304-0331-00		2
		- - * - -		
- 36	GA-27UUFPORM 5PCT	• CAPACITOR, FXD, 0.27 UUF 5%, 500 VDCW V78488 913-2970-00 C6		1
- 37	DA855-013	• CAPACITOR, FXD, 5 UUF 1%, 5000 VDCW V71590 913-0104-00 C7		1
		ATTACHING PARTS		
	MS35216-1	• SCREW, MACH. V77250 343-0122-00		2
	MS35338-77	• WASHER, LOCK V79807 310-0275-00		2
	SPL4040-2HOT TINNED	• TERMINAL, LUG V77147 304-0331-00		2
		- - * - -		
- 38	1N82A	• SEMICONDUCTOR DEVICE, DIO V96341 353-2542-00 CR14		1
- 39	DM15F471J03	• CAPACITOR, FXD, 470 UUF 5%, 300 VDCW V72136 912-2864-00 C9		1
- 40	10100-126	• COIL, RF, 0.47 UH V82142 240-0060-00 L5		1
- 41	DM15C050J01	• CAPACITOR, FXD, 5 UUF 5%, 500 VDCW V72136 912-2750-00 C8		1
- 42	10102-121	• COIL, RF, 15 UH V82142 240-0151-00 L6		1
- 43	548-3959-002	• COIL, RF L8		1
- 44	RC07GF472K	• RESISTOR, FXD, 4700 OHMS 10%, 1/4 W V01121 745-0773-00 R72		1
- 45	RC07GF682K	• RESISTOR, FXD, 6800 OHMS 10%, 1/4 W V01121 745-0779-00 R86		1
- 46	DM15C050J01	• CAPACITOR, FXD, 5 UUF 5%, 500 VDCW V72136 912-2750-00 C49		1
- 47	RC07GF470K	• RESISTOR, FXD, 47 OHMS 10%, 1/4 W V01121 745-0701-00 R21		1
- 48	CM05F221J03	• CAPACITOR, FXD, 220 UUF 5%, 500 VDCW V72136 912-2840-00 C66		1
- 49	548-3959-002	• COIL, RF L9		1
- 50	RC07GF472K	• RESISTOR, FXD, 4700 OHMS 10%, 1/4 W V01121 745-0773-00 R19		1
- 51	RC07GF682K	• RESISTOR, FXD, 6800 OHMS 10%, 1/4 W V01121 745-0779-00 R20		1
- 52	SPL4040-4HOT TINNED	• TERMINAL, LUG V77147 304-0332-00		1
		ATTACHING PARTS		
	MS35216-11	• SCREW, MACH. V77250 343-0132-00		1
		- - * - -		
- 53	548-3971-004	• SHIELD, CHASSIS		1
- 54	3307	• • SOCKET, TSTR V91662 352-9902-00 XQ2, XQ14, XQ15		3
		ATTACHING PARTS		
	757	• • RETAINER, TSTR SOC V91662 352-9904-00		3
		- - * - -		
- 55	CN401F80BWHT	• • JACK, TIP V87739 360-0090-00 J4		1
- 56	CN401F80BWHT	• • JACK, TIP V87739 360-0090-00 J3		1
- 57	CN401F80BWHT	• • JACK, TIP V87739 360-0090-00 J2		1
- 58	CN401F80BWHT	• • JACK, TIP V87739 360-0090-00 J1		1
- 59	503-4935-001	• • NUT, PLAIN, CLINCH		4
- 60	3307X	• • SOCKET, TSTR V91662 352-9903-00 XQ3		1
		ATTACHING PARTS		
	757	• • RETAINER, TSTR SOC V91662 352-9904-00		1
		- - * - -		

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
10 - 61	1P4-26A	. . TERMINAL, STUD V86577 306-0972-00		6
- 62	RFTSM52B2	. . TERMINAL, FEEDTHRU V12615 306-1291-00		2
- 63	SL158-198	. . TERMINAL, FEEDTHRU V12615 306-1270-00		3
- 64	A1956HOT TINNED	. . EYELET, METALLIC V57771 307-1216-00		3
- 65	548-3953-00	. . INSERT, SCR		6
- 66	SL173-197	. . TERMINAL, STANDOFF V12615 306-1261-00		6
- 67	SK801460X5 T0801P	. . CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C11		1
- 68	SK801460X5 T0801P	. . CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C12		1
- 69	SK801460X5 T0801P	. . CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C13		1
- 70	A1444HOT TINNED	. . EYELET, METALLIC V57771 307-1217-00		1
- 71	548-3970-004	. . SHIELD, CHASSIS		1
11 -	553-6537-005P	GLIDE SLOPE OSCILLATOR SUBASSEMBLY SEE FIG. 9-7 FOR NHA		REF
- 1	10100-125	. COIL, RF, 0.33 UH V82142 240-0068-00 L10		1
- 2	2N2362	. TRANSISTOR V87216 352-0407-00 Q1		1
- 3	1N270	. SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR5		1
- 4	1N270	. SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR4		1
- 5	RC07GF122K	. RESISTOR, FXD, 1200 OHMS 10%, 1/4 W V01121 745-0752-00 R93		1
- 6	1N270	. SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR3		1
- 7	1N270	. SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR2		1
- 8	1N270	. SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR1		1
- 9	10102-110	. COIL, RF, 3.30 UH V82142 240-0065-00 L11		1
- 10	RC07GF561K	. RESISTOR, FXD, 560 OHMS 10%, 1/4 W V01121 745-0740-00 R1		1
- 11	10102-110	. COIL, RF, 3.30 UH V82142 240-0065-00 L12		1
- 12	RC07GF561K	. RESISTOR, FXD, 560 OHMS 10%, 1/4 W V01121 745-0740-00 R2		1
- 13	10102-110	. COIL, RF, 3.30 UH V82142 240-0065-00 L13		1
- 14	RC07GF561K	. RESISTOR, FXD, 560 OHMS 10%, 1/4 W V01121 745-0740-00 R3		1
- 15	RC07GF561K	. RESISTOR, FXD, 560 OHMS 10%, 1/4 W V01121 745-0740-00 R4		1
- 16	10102-110	. COIL, RF, 3.30 UH V82142 240-0065-00 L14		1
- 17	10102-110	. COIL, RF, 3.30 UH V82142 240-0065-00 L15		1
- 18	RC07GF561K	. RESISTOR, FXD, 560 OHMS 10%, 1/4 W V01121 745-0740-00 R5		1
- 19	RC07GF822K	. RESISTOR, FXD, 8200 OHMS 10%, 1/4 W V01121 745-0782-00 R9		1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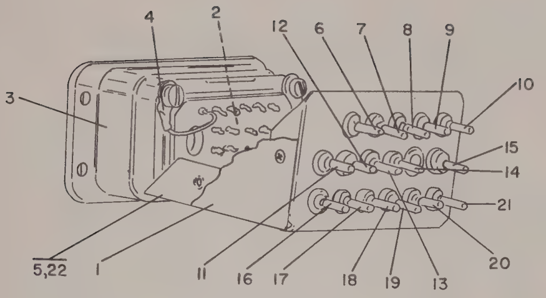
Glide Slope Oscillator Subassembly
Figure 11

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
11 - 20	RC07GF561K	• RESISTOR, FXD, 560 OHMS 10%, 1/4 W V01121 745-0740-00 R6		1
- 21	RC07GF561K	• RESISTOR, FXD, 560 OHMS 10%, 1/4 W V01121 745-0740-00 R7		1
- 22	RC07GF561K	• RESISTOR, FXD, 560 OHMS 10%, 1/4 W V01121 745-0740-00 R8		1
- 23	RC07GF122K	• RESISTOR, FXD, 1200 OHMS 10%, 1/4 W V01121 745-0752-00 R94		1
- 24	10102-110	• COIL, RF, 3.30 UH V82142 240-0065-00 L16		1
- 25	10102-110	• COIL, RF, 3.30 UH V82142 240-0065-00 L17		1
- 26	10102-110	• COIL, RF, 3.30 UH V82142 240-0065-00 L21		1
- 27	10102-110	• COIL, RF, 3.30 UH V82142 240-0065-00 L18		1
- 28	10102-110	• COIL, RF, 3.30 UH V82142 240-0065-00 L19		1
- 29	CK60AX471M	• CAPACITOR, FXD, 470 UUF 20%, 500 VDCW V01939 913-1189-00 C19		1
- 30	RC07GF123F	• RESISTOR, FXD, 12,000 OHMS 10%, 1/4 W V01121 745-0788-00 R16		1

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
11 - 31	RC07GF682K	. RESISTOR, FXD, 6800 OHMS 10%, 1/4 W V01121 745-0779-00 R17		1
- 32	RC07GF472K	. RESISTOR, FXD, 4700 OHMS 10%, 1/4 W V01121 745-0773-00 R18		1
- 33	CK60AX471M	. CAPACITOR, FXD, 4700 UUF 20%, 500 VDCW V01939 913-1189-00 C20		1
- 34	CM05F221J03	. CAPACITOR, FXD, 220 UUF 5%, 500 VDCW V72136 912-2840-00 C85		1
- 35	GA-33UUFPORM 5PCT	. CAPACITOR, FXD, 0.33 UUF 5%, 500 VDCW V78488 913-2972-00 C14		1
- 36	10100-128	. COIL, RF, 1 UH V82142 240-0062-00 L26		1
- 37	RC07GF270K	. RESISTOR, FXD, 27 OHMS 10%, 1/4 W V01121 745-0692-00 R96		1
- 38	CK60AX471M	. CAPACITOR, FXD, 470 UUF 20%, 500 VDCW V01939 913-1189-00 C16		1
- 39	549-6300-003	. COIL, OSC L7		1
- 40	1N270	. SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR9		1
- 41	10100-126	. COIL, RF, 0.47 UH V82142 240-0060-00 L23		1
- 42	CK60AX471M	. CAPACITOR, FXD, 470 UUF 20%, 500 VDCW V01939 913-1189-00 C68		1
- 43	1N270	. SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR8		1
- 44	10100-126	. COIL, RF, 0.47 UH V82142 240-0060-00 L22		1
- 45	CK60AX471M	. CAPACITOR, FXD, 470 UUF 20%, 500 VDCW V01939 913-1189-00 C88		1
- 46	1N270	. SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR7		1
- 47	10100-126	. COIL, RF, 0.47 UH V82142 240-0060-00 L20		1
- 48	CK60AX471M	. CAPACITOR, FXD, 470 UUF 20%, 500 VDCW V01939 913-1189-00 C81		1
- 49	1N270	. SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR6		1
- 50	10100-126	. COIL, RF, 0.47 UH V82142 240-0060-00 L24		1
- 51	1N647	. SEMICONDUCTOR DEVICE, DIO V03877 353-2596-00 CR28		1
- 52	1N457	. SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR43		1
- 53	1N457	. SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR42		1
- 54	RSM1B400R0F	. RESISTOR, FXD, 400 OHMS 1%, 1 W V91637 747-1371-00 R91		1
- 55	1N647	. SEMICONDUCTOR DEVICE, DIO V03877 353-2596-00 CR27		1
- 56	1N457	. SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR41		1
- 57	1N457	. SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR40		1
- 58	RSM1B400R0F	. RESISTOR, FXD, 400 OHMS 1%, 1 W V91637 747-1371-00 R95		1
- 59	1N647	. SEMICONDUCTOR DEVICE, DIO V03877 353-2596-00 CR26		1
- 60	1N457	. SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR39		1
- 61	RSM1B400R0F	. RESISTOR, FXD, 400 OHMS 1%, 1 W V91637 747-1371-00 R92		1

FIG.-ITEM	PART NO.	1 2 3 4 5 6 7 NOMENCLATURE	USAGE CODE	UNITS PER ASSY.
11 - 62	RC07GF103K	• RESISTOR, FXD, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 R15		1
- 63	1N647	• SEMICONDUCTOR DEVICE, DIO V03877 353-2596-00 CR25		1
- 64	1N457	• SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR44		1
- 65	1N457	• SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR37		1
- 66	1N647	• SEMICONDUCTOR DEVICE, DIO V03877 353-2596-00 CR24		1
- 67	1N457	• SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR36		1
- 68	RSM1B560R0F	• RESISTOR, FXD, 560 OHMS 1%, 1 W V91637 747-1372-00 R14		1
- 69	1N647	• SEMICONDUCTOR DEVICE, DIO V03877 353-2596-00 CR13		1
- 70	1N457	• SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR35		1
- 71	1N457	• SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR34		1
- 72	RSM1B560R0F	• RESISTOR, FXD, 560 OHMS 1%, 1 W V91637 747-1372-00 R13		1
- 73	1N647	• SEMICONDUCTOR DEVICE, DIO V03877 353-2596-00 CR12		1
- 74	1N457	• SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR33		1
- 75	1N457	• SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR32		1
- 76	RSM1B560R0F	• RESISTOR, FXD, 560 OHMS 1%, 1 W V91637 747-1372-00 R12		1
- 77	1N647	• SEMICONDUCTOR DEVICE, DIO V03877 353-2596-00 CR11		1
- 78	1N457	• SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR31		1
- 79	1N457	• SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR30		1
- 80	RSM1B560R0F	• RESISTOR, FXD, 560 OHMS 1%, 1 W V91637 747-1372-00 R11		1
- 81	1N647	• SEMICONDUCTOR DEVICE, DIO V03877 353-2596-00 CR10		1
- 82	1N457	• SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR29		1
- 83	1N457	• SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR38		1
- 84	RSM1B560R0F	• RESISTOR, FXD, 560 OHMS 1%, 1 W V91637 747-1372-00 R10		1
- 85	M9-3668	• CRYSTAL UNIT, QTZ V85675 289-3668-00 Y16		1
- 86	M9-3670	• CRYSTAL UNIT, QTZ V85675 289-3670-00 Y17		1
- 87	M9-3672	• CRYSTAL UNIT, QTZ V85675 289-3672-00 Y18		1
- 88	M9-3674	• CRYSTAL UNIT, QTZ V85675 289-3674-00 Y19		1
- 89	M9-3666	• CRYSTAL UNIT, QTZ V85675 289-3666-00 Y20		1
- 90	M9-3677	• CRYSTAL UNIT, QTZ V85675 289-3677-00 Y1		1
- 91	M9-3679	• CRYSTAL UNIT, QTZ V85675 289-3679-00 Y2		1
- 92	M9-3661	• CRYSTAL UNIT, QTZ V85675 289-3661-00 Y3		1
- 93	M9-3663	• CRYSTAL UNIT, QTZ V85675 289-3663-00 Y4		1

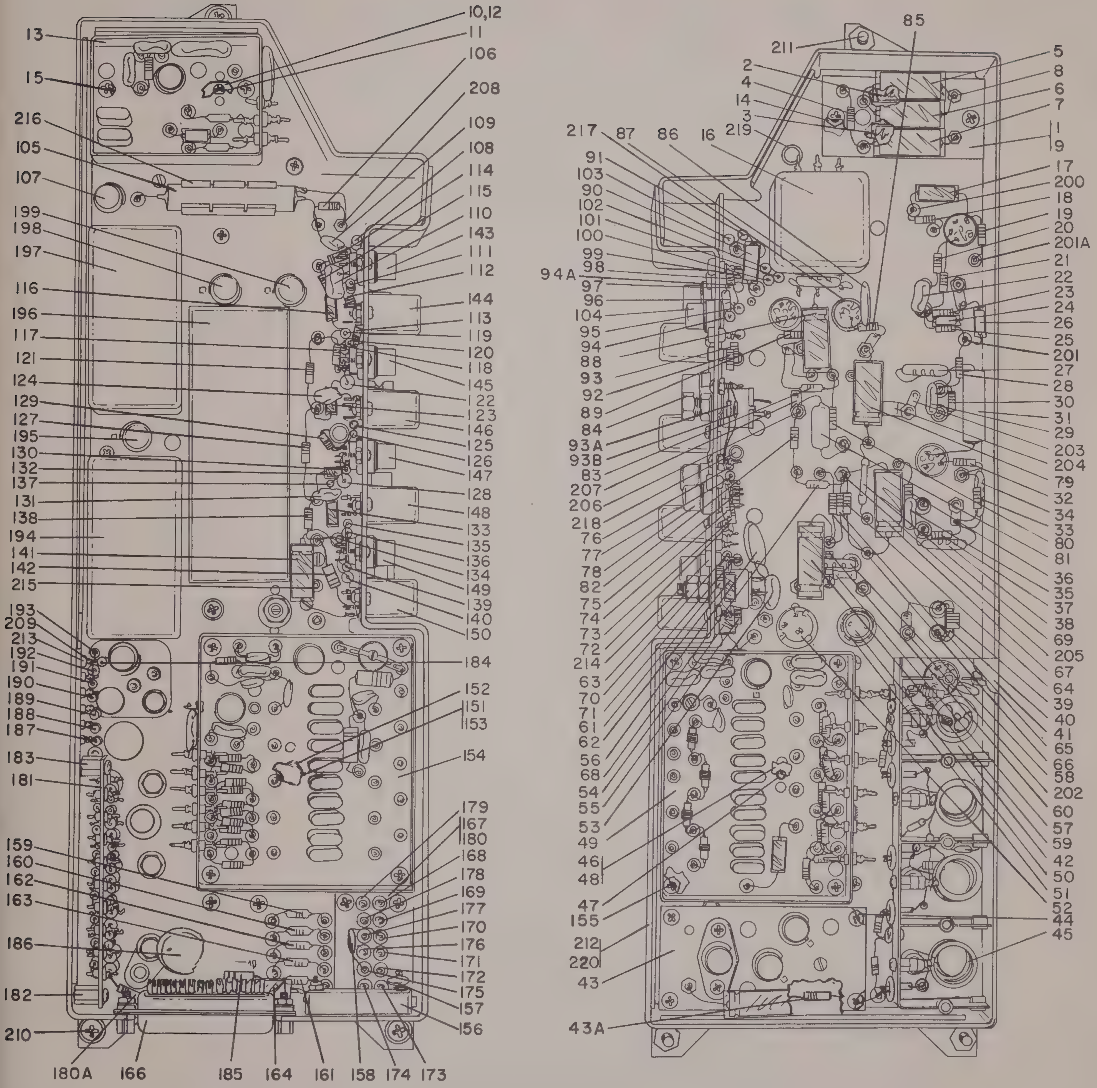
FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
11 - 94	M9-3665	. CRYSTAL UNIT, QTZ V85675 289-3665-00 Y5		1
- 95	M9-3667	. CRYSTAL UNIT, QTZ V85675 289-3667-00 Y6		1
- 96	M9-3669	. CRYSTAL UNIT, QTZ V85675 289-3669-00 Y7		1
- 97	M9-3671	. CRYSTAL UNIT, QTZ V85675 289-3671-00 Y8		1
- 98	M9-3673	. CRYSTAL UNIT, QTZ V85675 289-3673-00 Y9		1
- 99	M9-3675	. CRYSTAL UNIT, QTZ V85675 289-3675-00 Y10		1
-100	M9-3678	. CRYSTAL UNIT, QTZ V85675 289-3678-00 Y11		1
-101	M9-3676	. CRYSTAL UNIT, QTZ V85675 289-3676-00 Y12		1
-102	M9-3662	. CRYSTAL UNIT, QTZ V85675 289-3662-00 Y13		1
-103	M9-3664	. CRYSTAL UNIT, QTZ V85675 289-3664-00 Y14		1
-104	M9-3660	. CRYSTAL UNIT, QTZ V85675 289-3660-00 Y15		1
-105	340-0644-00	. SLEEVE, SPG		1
		ATTACHING PARTS		
	COML	. SCREW, MACH. 343-2642-00		1
		- - * - -		
-106	553-6312-005	. CHASSIS, ELECTRICAL EQUIP.		1
-107	549-6295-002	. . POST, SPACING		1
		ATTACHING PARTS		
	COML	. . SCREW, MACH. 343-2642-00		1
	340-0644-00	. . SLEEVE, SPG		1
		- - * - -		
-108	A1444HOT TINNED	. . EYELET, METALLIC V57771 307-1217-00		1
-109	LHTA51M2860-40	. . NUT, SELF-LKG, PLATE V72962 333-1016-00		1
		ATTACHING PARTS		
	MS20426AD2-2	. . RIVET, SOLID V12014 305-1351-00		1
		- - * - -		
-110	3307	. . SOCKET, TSTR V91662 352-9902-00 XQ1		1
		ATTACHING PARTS		
	757	. . RETAINER, TSTR SOC V91662 352-9904-00		1
		- - * - -		
-111	2559	. . TERMINAL, FEEDTHRU V12615 306-0917-00		7
-112	102-130	. . TERMINAL, STUD V12615 306-0900-00		27
-113	SK801460X5 T0801P	. . CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C72		1
-114	SK801460X5 T0801P	. . CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C73		1
-115	SK801460X5 T0801P	. . CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C74		1
-116	SK801460X5 T0801P	. . CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C75		1
-117	SK801460X5 T0801P	. . CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C76		1
-118	SK801460X5 T0801P	. . CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C77		1
-119	SK801460X5 T0801P	. . CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C78		1
-120	SK801460X5 T0801P	. . CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C79		1
-121	SK801460X5 T0801P	. . CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C80		1
-122	SK801460X5 T0801P	. . CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C69		1
-123	RFTSM52B2	. . TERMINAL, FEEDTHRU V12615 306-1291-00		62
-124	553-6311-005	. . CHASSIS, ELECTRICAL EQUIP.		1



Branched Wiring Harness
Figure 12

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
12 -	48-3947-00	WIRING HARNESS SEE FIG. 9-139 FOR NHA		REF
- 1	548-3964-003	. FRAME, FIL		1
		ATTACHING PARTS		
	COML	. SCREW, MACH. 343-0297-00		4
	MS35338-77	. WASHER, LOCK V79807 310-0275-00		4
		- - * - -		
- 2	DPA53572-1	. CONNECTOR INSERT, COAX. V91146 370-2183-00		1
- 3	DPA24W2-34P1	. CONNECTOR, RECP V91146 370-2177-00 P1		1
- 4	SPL4040-2HOT TINNED	. TERMINAL, LUG V77147 304-0331-00		2
- 5	548-6770-003	. CAPACITOR ASSY, FIL		1
- 6	SK801460X5 T0801P	. . CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C50		1
- 7	SK801460X5 T0801P	. . CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C51		1
- 8	SK801460X5 T0801P	. . CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C52		1
- 9	SK801460X5 T0801P	. . CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C53		1
- 10	SK801460X5 T0801P	. . CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C54		1

	FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
	12 - 11	SK801460X5 T0801P	• • CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C55		1
	- 12	SK801460X5 T0801P	• • CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C56		1
	- 13	SK801460X5 T0801P	• • CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C57		1
	- 14	SK801460X5 T0801P	• • CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C58		1
	- 15	SK801460X5 T0810P	• • CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C59		1
	- 16	SK801460X5 T0801P	• • CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C60		1
	- 17	SK801460X5 T0801P	• • CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C61		1
	- 18	SK801460X5 T0801P	• • CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C62		1
	- 19	SK801460X5 T0801P	• • CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C63		1
	- 20	SK801460X5 T0801P	• • CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C64		1
	- 21	SK801460X5 T0801P	• • CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C65		1
	- 22	548-6769-003	• • CAPACITOR ASSY, FIL		1
	13 -	522-3196-005	51X-4 VOR RADIO RECEIVER SEE FIG. 1-7 FOR NHA		REF
	- 1	548-7831-003	• TERMINAL BOARD ASSY		1
			ATTACHING PARTS		
		MS35216-11	• SCREW, MACH. V77250 343-0132-00		2
		COML	• WASHER, LOCK 310-0396-00		2
			– – * – –		
	- 2	K150J15S	• • CAPACITOR, FXD, 150 UF 20%, 15 VDCW V05397 184-7656-00 C146		1
	- 3	K150J15S	• • CAPACITOR, FXD, 150 UF 20%, 15 VDCW V05397 184-7656-00 C130		1
R	- 4	RC07GF470K	• • RESISTOR, FXD, 47 OHMS 10%, 1/4 W V01121 745-0701-00 R128 EFF THRU MCN 567 ONLY		1
R	- 5	K100J20S	• • CAPACITOR, FXD, 100 UF 20%, 20 VDCW V05397 184-7412-00 C143 EFF THRU MCN 567 ONLY		1
R	- 6	K100J20S	• • CAPACITOR, FXD, 100 UF 20%, 20 VDCW V05397 184-7412-00 C144 EFF THRU MCN 567 ONLY		1
R	- 7	K100J20S	• • CAPACITOR, FXD, 100 UF 20%, 20 VDCW V05397 184-7412-00 C145 EFF THRU MCN 567 ONLY		1
R	- 8	AB406D	• • TERMINAL, UNINSULATED, GROUND V12615 306-1311-00 EFF THRU MCN 567		2
R	- 8	AB404D	• • TERMINAL, UNINSULATED, GROUND V12615 306-1309-00 EFF MCN 568		2
			ATTACHING PARTS		
		MS35649-24	• • NUT, PLAIN, HEX. V77250 313-0037-00		2
		COML	• • WASHER, LOCK 310-0075-00		2
			– – * – –		
	- 9	548-7830-003	• • PLATE, MTG TB3		1
	- 10	553-6479-003	• COVER, OSC		1
	- 11	553-6462-002	• • SPACER, SLV		1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51X-4 VOR Radio Receiver
Figure 13

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
13 - 12	553-6478-003	. . COVER, OSC		1
- 13	553-6512-004P	. OSCILLATOR SUBASSEMBLY SEE FIG. 19		1
		ATTACHING PARTS		
	MS35216-11	. SCREW, MACH. V77250 343-0132-00		2
	COML	. WASHER, LOCK 310-0396-00		2
		- - * - -		
- 14	540-9166-003	. POST, ELECTRICAL-MECHANICAL EQUIP.		2
- 15	540-9036-003	. POST, ELECTRICAL-MECHANICAL EQUIP.		2
		ATTACHING PARTS FOR 14 AND 15		
	COML	. STUD, CONTINUOUS THD 312-0007-00		2
		- - * - -		
- 16	A14050	. TRANSFORMER, AF V70674 667-0087-00 T6		1
		ATTACHING PARTS		
	MS35216-11	. SCREW, MACH. V77250 343-0132-00		2
		- - * - -		
- 17	K4R7J35S	. CAPACITOR, FXD, 4.7 UF 20%, 35 VDCW V05397 184-7396-00 C98		1
- 18	RC07GF152K	. RESISTOR, FXD, 1500 OHMS 10%, 1/4 W V01121 745-0755-00 R85		1
- 19	RC07GF272K	. RESISTOR, FXD, 2700 OHMS 10%, 1/4 W V01121 745-0764-00 R84		1
- 20	RC07GF561K	. RESISTOR, FXD, 560 OHMS 10%, 1/4 W V01121 745-0740-00 R133		1
- 21	RC07GF102K	. RESISTOR, FXD, 1000 OHMS 10%, 1/4 W V01121 745-0749-00 R82		1
- 22	CM05F331J03	. CAPACITOR, FXD, 330 UUF 5%, 500 VDCW V72136 912-2852-00 C95		1
- 23	RC07GF393K	. RESISTOR, FXD, 39,000 OHMS 10%, 1/4 W V01121 745-0806-00 R81		1
- 24	STA552-1	. CAPACITOR, FXD, 100,000 UUF 20%, 35 VDCW V21520 184-7408-00 C96		1
- 25	RC07GF103K	. RESISTOR, FXD, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 R83		1
- 26	K1J35S	. CAPACITOR, FXD, 1 UF 20%, 35 VDCW V05397 184-7398-00 C126		1
- 27	913-3104-00	. CAPACITOR, FXD, 100,000 UUF +50-20%, 30 VDCW C131		1
- 28	RC07GF470K	. RESISTOR, FXD, 47 OHMS 10%, 1/4 W V01121 745-0701-00 R135		1
- 29	DM15C100J01	. CAPACITOR, FXD, 10 UUF 5%, 500 VDCW V72136 912-2753-00 C93		1
- 30	RC07GF392K	. RESISTOR, FXD, 3900 OHMS 10%, 1/4 W V01121 745-0770-00 R79		1
- 31	10404-28	. COIL, RF, 47 UH V82142 240-0190-00 L50		1
- 32	RC07GF120K	. RESISTOR, FXD, 12 OHMS 10%, 1/4 W V01121 745-0680-00 R136		1
- 33	RC07GF182K	. RESISTOR, FXD, 1800 OHMS 10%, 1/4 W V01121 745-0758-00 R78		1
- 34	913-3104-00	. CAPACITOR, FXD, 100,000 UUF +50-20%, 30 VDCW C92		1
- 35	CM05F131J03	. CAPACITOR, FXD, 130 UUF 5%, 500 VDCW V72136 912-2825-00 C89		1
- 36	RC07GF332K	. RESISTOR, FXD, 3300 OHMS 10%, 1/4 W V01121 745-0767-00 R77		1
- 37	RC07GF272K	. RESISTOR, FXD, 2700 OHMS 10%, 1/4 W V01121 745-0764-00 R76		1
- 38	913-3104-00	. CAPACITOR, FXD, 100,000 UUF +50-20%, 30 VDCW C90		1
- 39	GA6-2UUFPORM 5PCT	. CAPACITOR, FXD, 6.2 UUF 5%, 500 VDCW V78488 913-2995-00 C88		1

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
13		ATTACHING PARTS		
	MS35216-17	• • SCREW, MACH. V77250 343-0138-00		1
		- - * - -		
- 40	RC07GF103K	• RESISTOR, FXD, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 R140		1
- 41	553-6436-003	• SPACER, SLV		1
		ATTACHING PARTS		
	MS35216-1	• SCREW, MACH. V77250 343-0122-00		5
		- - * - -		
- 42	553-6515-004	• AMPLIFIER-FILTER-MIXER ASSY SEE FIG. 14		1
		ATTACHING PARTS		
	MS35200-1	• SCREW, MACH. V77250 342-0131-00		5
		- - * - -		
- 43	553-6496-003	• VOLTAGE REGULATOR SEE FIG. 15		1
		ATTACHING PARTS		
	MS35216-11	• SCREW, MACH. V77250 343-0132-00		2
	MS35216-12	• SCREW, MACH. V77250 343-0133-00		2
	COML	• WASHER, LOCK 310-0396-00		4
	SPL4040-4HOT TINNED	• TERMINAL, LUG V77147 304-0332-00		1
		- - * - -		
R - 43A	184-7724-00	• CAPACITOR, FXD, 47 UF 20%, 20 VDCW C148 EFF MCN 568 FSB NO. 3		1
- 44	553-6541-002	• POST, ELECTRICAL-MECHANICAL EQUIP.		1
- 45	540-9043-003	• POST, ELECTRICAL-MECHANICAL EQUIP.		3
		ATTACHING PARTS FOR 44 AND 45		
R	MS35216-11	• SCREW, MACH. V77250 343-0132-00		2
		- - * - -		
	COML	• WASHER, LOCK 310-0396-00		2
		- - * - -		
- 46	553-6483-003	• COVER, OSC		1
- 47	553-6463-002	• • SPACER, SLV		1
		ATTACHING PARTS		
	MS35200-18	• • SCREW, MACH. V77250 342-0050-00		1
		- - * - -		
- 48	553-6482-003	• • COVER, OSC		1
- 49	553-6514-004P	• OSCILLATOR SUBASSEMBLY SEE FIG. 16		1
		ATTACHING PARTS		
	MS35216-11	• SCREW, MACH. V77250 343-0132-00		4
	COML	• WASHER, LOCK 310-0396-00		4
		- - * - -		
- 50	2N697	• TRANSISTOR V07933 352-0494-00 Q17		1
- 51	TXBP032-037-3	• HOLDER, SEMICONDUCTOR V98978 352-9885-00		1
		ATTACHING PARTS		
	COML	• WASHER, NONMETALLIC 303-1021-00		1
		- - * - -		
- 52	BJ24246	• RESISTOR, VAR, 2500 OHMS 20%, 1/2 W V71450 380-1665-00 R111		1
		ATTACHING PARTS		
	COML	• NUT, PLAIN, HEX. 334-0282-00		1
	1914-05-00-2480	• WASHER, LOCK V78189 373-0035-00		1
		- - * - -		
- 53	DM15F510J03	• CAPACITOR, FXD, 510 UUF 5%, 300 VDCW V72136 912-2867-00 C115		1
- 54	J301-1000	• COIL, RF, 1000 UH V76487 240-2540-00 L49		1
- 55	1N270	• SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR62		1
- 56	CK62AW472M	• CAPACITOR, FXD, 4700 UUF 20%, 500 VDCW V01939 913-1187-00 C116		1
- 57	714-1756-00	• RESISTOR, THRM, 50,000 OHMS 10%, 0.5 W RT1		1

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
13 - 58	913-3104-00	• CAPACITOR, FXD, 100,000 UUF +50-20%, 30 VDCW C129		1
- 59	CL25BG400UP3	• CAPACITOR, FXD, 40 UF +75-15%, 25 VDCW V56289 184-7260-00 C121		1
- 60	RC07GF103K	• RESISTOR, FXD, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 R116		1
- 61	RC07GF104K	• RESISTOR, FXD, 100,000 OHMS 10%, 1/4 W V01121 745-0821-00 R107		1
- 62	STA552-1	• CAPACITOR, FXD, 100,000 UUF 20%, 35 VDCW V21520 184-7408-00 C119		1
- 63	BJ24246	• RESISTOR, VAR, 2500 OHMS 20%, 1/2 W V71450 380-1665-00 R104		1
		ATTACHING PARTS		
	COML	• NUT, PLAIN, HEX. 334-0282-00		1
	1914-05-00-2480	• WASHER, LOCK V78189 373-0035-00		1
		- - * - -		
- 64	RC07GF560K	• RESISTOR, FXD, 56 OHMS 10%, 1/4 W V01121 745-0704-00 R114		1
- 65	RC07GF391K	• RESISTOR, FXD, 390 OHMS 10%, 1/4 W V01121 745-0734-00 R112		1
- 66	RC07GF272K	• RESISTOR, FXD, 2700 OHMS 10%, 1/4 W V01121 745-0764-00 R113		1
- 67	K150J15S	• CAPACITOR, FXD, 150 UF 20%, 15 VDCW V05397 184-7656-00 C122		1
- 68	1N965B	• SEMICONDUCTOR DEVICE, DIO V04713 353-3176-00 CR75		1
- 69	1550S30000-5PCT	• RESISTOR, FXD, 1.6 OHMS 5%, 1 W V00213 747-9741-00 R117		1
- 70	STA552-1	• CAPACITOR, FXD, 100,000 UUF 20%, 35 VDCW V21520 184-7408-00 C117		1
- 71	RC07GF104K	• RESISTOR, FXD, 100,000 OHMS 10%, 1/4 W V01121 745-0821-00 R105		1
- 72	RC07GF104K	• RESISTOR, FXD, 100,000 OHMS 10%, 1/4 W V01121 745-0821-00 R106		1
- 73	RC07GF104K	• RESISTOR, FXD, 100,000 OHMS 10%, 1/4 W V01121 745-0821-00 R109		1
- 74	1N270	• SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR64		1
- 75	RC07GF823K	• RESISTOR, FXD, 82,000 OHMS 10%, 1/4 W V01121 745-0818-00 R108		1
- 76	RC07GF473K	• RESISTOR, FXD, 47,000 OHMS 10%, 1/4 W V01121 745-0809-00 R110		1
- 77	K1J35S	• CAPACITOR, FXD, 1 UF 20%, 35 VDCW V05397 184-7398-00 C118		1
- 78	2N697	• TRANSISTOR V07933 352-0494-00 Q16		1
- 79	K100J20S	• CAPACITOR, FXD, 100 UF 20%, 20 VDCW V05397 184-7412-00 C128		1
- 80	RC07GF472K	• RESISTOR, FXD, 4700 OHMS 10%, 1/4 W V01121 745-0773-00 R115		1
R **- 81**	**RW69V3R3**	**• RESISTOR, FXD, 3.3 OHMS 5%, 3 W V91637 747-5366-00 R91**		1
- 82	RC07GF120K	• RESISTOR, FXD, 12 OHMS 10%, 1/4 W V01121 745-0680-00 R80		1
- 83	1N816	• SEMICONDUCTOR DEVICE, DIO V03877 353-2564-00 CR72		1
- 84	BJ24248	• RESISTOR, VAR, 250 OHMS 20%, 1/2 W V71450 380-1667-00 R95		1
		ATTACHING PARTS		
	COML	• NUT, PLAIN, HEX. 334-0282-00		1
	1914-05-00-2480	• WASHER, LOCK V78189 373-0035-00		1
		- - * - -		

	FIG.-ITEM	PART NO.	1 2 3 4 5 6 7 NOMENCLATURE	USAGE CODE	UNITS PER ASSY.
	13 - 85	RC07GF150K	• RESISTOR, FXD, 15 OHMS 10%, 1/4 W V01121 745-0683-00 R119		1
	- 86	CK62AW472M	• CAPACITOR, FXD, 4700 UUF 20%, 500 VDCW V01939 913-1187-00 C141		1
	- 87	913-3104-00	• CAPACITOR, FXD, 100,000 UUF +50-20%, 30 VDCW C124		1
	- 88	K100J20S	• CAPACITOR, FXD, 100 UF 20%, 20 VDCW V05397 184-7412-00 C127		1
	- 89	RC07GF150K	• RESISTOR, FXD, 15 OHMS 10%, 1/4 W V01121 745-0683-00 R118		1
	- 90	CL65CG181MP3	• CAPACITOR, FXD, 180 UF 20%, 25 VDCW V56289 184-8664-00 C94		1
	- 91	CK62AW472M	• CAPACITOR, FXD, 4700 UUF 20%, 500 VDCW V01939 913-1187-00 C140		1
R	- 92	RC07GF331K	• RESISTOR, FXD, 330 OHMS 10%, 1/4 W V01121 745-0731-00 R124 EFF THRU MCN 567		1
R	- 92	RC07GF221K	• RESISTOR, FXD, 220 OHMS 10%, 1/4 W V01121 745-0725-00 R124 EFF MCN 568		1
	- 93	RC07GF102K	• RESISTOR, FXD, 1000 OHMS 10%, 1/4 W V01121 745-0749-00 R123		1
R	- 93A	PS8860	• SEMICONDUCTOR DEVICE, DIO V01281 353-2894-00 CR77 EFF MCN 568		1
R	- 93B	855502X5G 0103P	• CAPACITOR, FXD, 10,000 UUF 80-20%, 100 VDCW V72982 913-3680-00 C149 EFF MCN 568		1
R	- 94	1N270	• SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR74 EFF THRU MCN 846		1
R	- 94	1N457A	• SEMICONDUCTOR DEVICE, DIO V03508 353-3390-00 CR74 EFF MCN 847		1
R	- 94A	1N270	• SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR76 EFF THRU MCN 846		1
R	- 94A	1N457A	• SEMICONDUCTOR DEVICE, DIO V03508 353-3390-00 CR76 EFF MCN 847		1
	- 95	353-2894-00	• SEMICONDUCTOR DEVICE, DIO CR73		1
	- 96	1N270	• SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR65		1
	- 97	1N270	• SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR66		1
R	- 98	RC07GF471K	• RESISTOR, FXD, 470 OHMS 10%, 1/4 W V01121 745-0737-00 R129 EFF THRU MCN 567		1
R	- 98	RC07GF561K	• RESISTOR, FXD, 560 OHMS 10%, 1/4 W V01121 745-0740-00 R129 EFF MCN 568		1
	- 99	RC07GF472K	• RESISTOR, FXD, 4700 OHMS 10%, 1/4 W V01121 745-0773-00 R127		1
	-100	RC07GF682K	• RESISTOR, FXD, 6800 OHMS 10%, 1/4 W V01121 745-0779-00 R90		1
	-101	RC07GF101K	• RESISTOR, FXD, 100 OHMS 10%, 1/4 W V01121 745-0713-00 R120		1
	-102	353-2894-00	• SEMICONDUCTOR DEVICE, DIO CR63		1
	-103	RC07GF822K	• RESISTOR, FXD, 8200 OHMS 10%, 1/4 W V01121 745-0782-00 R122		1
	-104	2N697	• TRANSISTOR V07933 352-0494-00 Q18		1
R	-105	43D56C	• FILTER, BAND PASS V06961 241-0455-00 FL3 EFF THRU MCN 659		1
R	-105	241-0528-00P	• FILTER, BAND PASS FL3 EFF MCN 660		1
	-106	RC07GF152K	• RESISTOR, FXD, 1500 OHMS 10%, 1/4 W V01121 745-0755-00 R86		1
	-107	2N2398	• TRANSISTOR V87216 352-0406-00 Q11		1
	-108	K1J35S	• CAPACITOR, FXD, 1 UF 20%, 35 VDCW V05397 184-7398-00 C102		1

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
13 -109	CM05F271J03	• CAPACITOR, FXD, 270 UUF 5%, 500 VDCW V72136 912-2846-00 C101		1
-110	CM05F331J03	• CAPACITOR, FXD, 330 UUF 5%, 500 VDCW V72136 912-2852-00 C99		1
-111	RC07GF821K	• RESISTOR, FXD, 820 OHMS 10%, 1/4 W V01121 745-0746-00 R88		1
-112	RC07GF102K	• RESISTOR, FXD, 1000 OHMS 10%, 1/4 W V01121 745-0749-00 R89		1
-113	RC07GF102K	• RESISTOR, FXD, 1000 OHMS 10%, 1/4 W V01121 745-0749-00 R93		1
-114	RC07GF222K	• RESISTOR, FXD, 2200 OHMS 10%, 1/4 W V01121 745-0761-00 R87		1
-115		DELETED		
-116	KRC22J35S	• CAPACITOR, FXD, 22,000 UUF 20%, 35 VDCW V05397 184-7673-00 C103		1
-117	RC07GF472K	• RESISTOR, FXD, 4700 OHMS 10%, 1/4 W V01121 745-0773-00 R137		1
-118	K1J35S	• CAPACITOR, FXD, 1 UF 20%, 35 VDCW V05397 184-7398-00 C104		1
-119	RC07GF102K	• RESISTOR, FXD, 1000 OHMS 10%, 1/4 W V01121 745-0749-00 R94		1
-120	KRC22J35S	• CAPACITOR, FXD, 22,000 UUF 20%, 35 VDCW V05397 184-7673-00 C105		1
-121	RC07GF470K	• RESISTOR, FXD, 47 OHMS 10%, 1/4 W V01121 745-0701-00 R92		1
-122	K4R7J35S	• CAPACITOR, FXD, 4.7 UF 20%, 35 VDCW V05397 184-7396-00 C106		1
-123	K1J35S	• CAPACITOR, FXD, 1 UF 20%, 35 VDCW V05397 184-7398-00 C107		1
-124	DM15F471J03	• CAPACITOR, FXD, 470 UUF 5%, 330 VDCW V72136 912-2864-00 C135		1
-125	RC07GF272K	• RESISTOR, FXD, 2700 OHMS 10%, 1/4 W V01121 745-0764-00 R97		1
-126	K1J35S	• CAPACITOR, FXD, 1 UF 20%, 35 VDCW V05397 184-7398-00 C108		1
-127	RC07GF470K	• RESISTOR, FXD, 47 OHMS 10%, 1/4 W V01121 745-0701-00 R98		1
-128	K4R7J35S	• CAPACITOR, FXD, 4.7 UF 20%, 35 VDCW V05397 184-7396-00 C109		1
-129	RC07GF332K	• RESISTOR, FXD, 3300 OHMS 10%, 1/4 W V01121 745-0767-00 R96		1
-130	RC07GF471K	• RESISTOR, FXD, 470 OHMS 10%, 1/4 W V01121 745-0737-00 R99		1
-131	DM15F471J03	• CAPACITOR, FXD, 470 UUF 5%, 330 VDCW V72136 912-2864-00 C136		1
-132	K1J35S	• CAPACITOR, FXD, 1 UF 20%, 35 VDCW V05397 184-7398-00 C110		1
-133	K1J35S	• CAPACITOR, FXD, 1 UF 20%, 35 VDCW V05397 184-7398-00 C114		1
-134	RC07GF152K	• RESISTOR, FXD, 1500 OHMS 10%, 1/4 W V01121 745-0755-00 R130		1
-135	RC07GF271K	• RESISTOR, FXD, 270 OHMS 10%, 1/4 W V01121 745-0728-00 R101		1
-136	K1J35S	• CAPACITOR, FXD, 1 UF 20%, 35 VDCW V05397 184-7398-00 C111		1
-137	RC07GF271K	• RESISTOR, FXD, 270 OHMS 10%, 1/4 W V01121 745-0728-00 R100		1
-138	RC07GF470K	• RESISTOR, FXD, 47 OHMS 10%, 1/4 W V01121 745-0701-00 R102		1
-139	RC07GF680K	• RESISTOR, FXD, 68 OHMS 10%, 1/4 W V01121 745-0707-00 R103		1

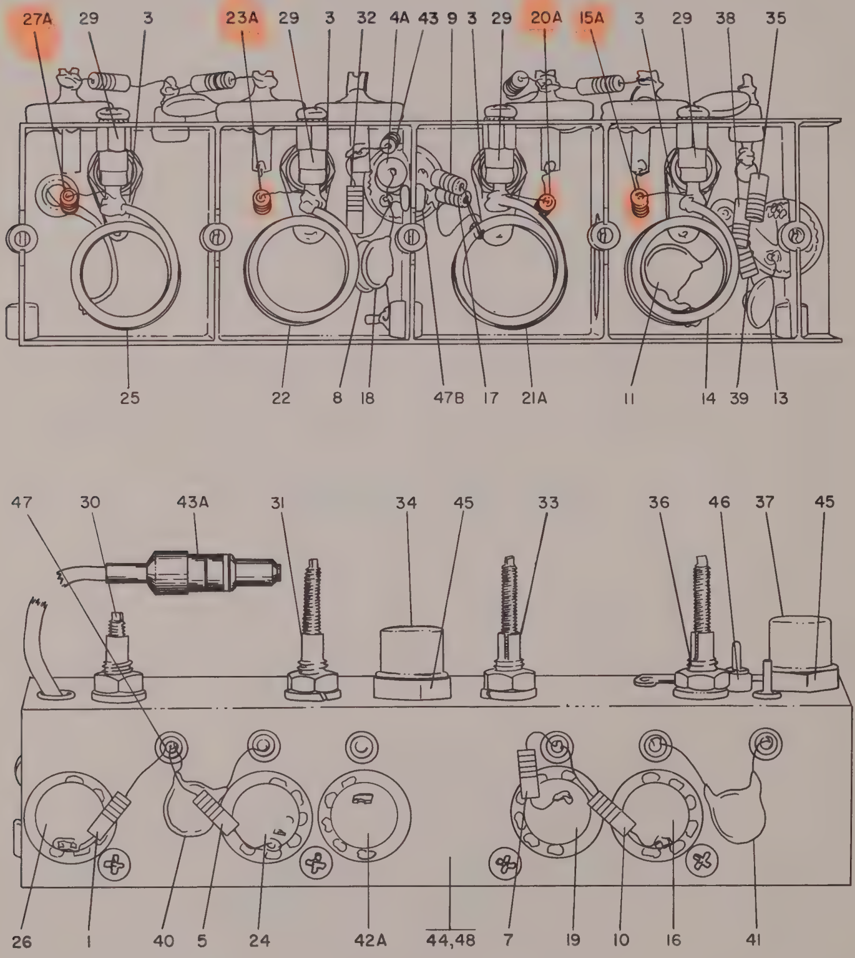
FIG.-ITEM	PART NO.	1 2 3 4 5 6 7 NOMENCLATURE	USAGE CODE	UNITS PER ASSY.
13 -140	K1J35S	• CAPACITOR, FXD, 1 UF 20%, 35 VDCW V05397 184-7398-00 C113		1
-141	K120J10S	• CAPACITOR, FXD, 120 UF 20%, 10 VDCW V05397 184-7652-00 C112		1
-142	J301-500	• COIL, RF, 500 UH V76487 240-2533-00 L48		1
-143	2N697	• TRANSISTOR V07933 352-0494-00 Q12		1
-144	278-1845-00	• TRANSFORMER, 1-F T2		1
		ATTACHING PARTS		
	68-1660-26	• NUT, SELF-LKG, HEX. V72962 333-0604-00		2
	COML	• WASHER, FLAT 310-0044-00		2
	SPL4040-2HOT TINNED	• TERMINAL, LUG V77147 304-0331-00		1
	MS35216-3	• SCREW, MACH. V77250 343-0124-00		2
		- - * - -		
-145	2N697	• TRANSISTOR V07933 352-0494-00 Q13		1
-146	278-1826-00	• TRANSFORMER, 1-F T3		1
		ATTACHING PARTS		
	68-1660-26	• NUT, SELF-LKG, HEX. V72962 333-0604-00		2
	COML	• WASHER, FLAT 310-0044-00		2
	SPL4040-2HOT TINNED	• TERMINAL, LUG V77147 304-0331-00		1
	MS35216-3	• SCREW, MACH. V77250 343-0124-00		2
		- - * - -		
-147	2N697	• TRANSISTOR V07933 352-0494-00 Q14		1
-148	278-1826-00	• TRANSFORMER, 1-F T4		1
		ATTACHING PARTS		
	68-1660-26	• NUT, SELF-LKG, HEX. V72962 333-0604-00		2
	COML	• WASHER, FLAT 310-0044-00		2
	SPL4040-2HOT TINNED	• TERMINAL, LUG V77147 304-0331-00		1
	MS35216-3	• SCREW, MACH. V77250 343-0124-00		2
		- - * - -		
-149	2N697	• TRANSISTOR V07933 352-0494-00 Q15		1
-150	278-1823-00	• TRANSFORMER, 1-F T5		1
		ATTACHING PARTS		
	68-1660-26	• NUT, SELF-LKG, HEX. V72962 333-0604-00		2
	COML	• WASHER, FLAT 310-0044-00		2
	SPL4040-2HOT TINNED	• TERMINAL, LUG V77147 304-0331-00		1
	MS35216-3	• SCREW, MACH. V77250 343-0124-00		2
		- - * - -		
-151	553-6481-003	• COVER, OSC		1
-152	553-6463-002	• • SPACER, SLV		1
		ATTACHING PARTS		
	MS35200-18	• • SCREW, MACH. V77250 342-0050-00		1
		- - * - -		
-153	553-6480-003	• • COVER, OSC		1
-154	553-6513-004	• OSCILLATOR SUBASSEMBLY SEE FIG. 17		1
		ATTACHING PARTS		
	MS35216-11	• SCREW, MACH. V77250 343-0132-00		4
	COML	• WASHER, LOCK 310-0396-00		4
		- - * - -		
-155	540-9036-003	• POST, ELECTRICAL-MECHANICAL EQUIP.		8
		ATTACHING PARTS		
	MS35216-11	• SCREW, MACH. V77250 343-0132-00		2
	AN500C4-3	• SCREW, MACH. V77250 347-0005-00		2
	COML	• WASHER, LOCK 310-0396-00		2
	COML	• STUD, CONTINUOUS THD 312-0005-00		2
		- - * - -		
-156	200L1-202	• RESISTOR, VAR, 2000 OHMS 10%, 1/4 W V80294 377-9163-00 R70		1

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
13		ATTACHING PARTS		
	68-1660-26	• NUT, SELF-LKG, HEX. V72962 333-0604-00		2
	MS35200-7	• SCREW, MACH. V77250 342-0137-00		2
		- - * - -		
-157	55C30	• CAPACITOR, FXD, 2500 UUF +80-20%, 500 VDCW V01939 913-3154-00 C138		1
-158	55C30	• CAPACITOR, FXD, 2500 UUF +80-20%, 500 VDCW V01939 913-3154-00 C137		1
-159	1N647	• SEMICONDUCTOR DEVICE, DIO V03877 353-2596-00 CR71		1
-160	1N647	• SEMICONDUCTOR DEVICE, DIO V03877 353-2596-00 CR70		1
-161	1N647	• SEMICONDUCTOR DEVICE, DIO V03877 353-2596-00 CR69		1
-162	1N647	• SEMICONDUCTOR DEVICE, DIO V03877 353-2596-00 CR68		1
-163	1N647	• SEMICONDUCTOR DEVICE, DIO V03877 353-2596-00 CR67		1
R -164	K150J15S	• CAPACITOR, FXD, 150 UF 20%, 15 VDCW V05397 184-7656-00 C125 EFF THRU MCN 659		1
R -164	K100J20S	• CAPACITOR, FXD, 100 UF 20%, 20 VDCW V05397 184-7412-00 EFF MCN 660 FSB NO. 7		1
R -165		DELETED		
R -166	DBM21W1P	• CONNECTOR, RECP V71468 371-0915-00 P4		1
		ATTACHING PARTS		
	20418-2	• SCREW, ASSEMBLED CLIP V71468 371-0062-00		2
		- - * - -		
-167	553-6495-003	• CAPACITOR ASSY		1
		ATTACHING PARTS		
R	MS35216-11	• SCREW, MACH. V77250 343-0132-00		4
		- - * - -		
-168	SK801460X5 T0801P	• • CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C75		1
-169	SK801460X5 T0801P	• • CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C76		1
-170	SK801460X5 T0801P	• • CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C77		1
-171	SK801460X5 T0801P	• • CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C78		1
-172	SK801460X5 T0801P	• • CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C79		1
-173	SK801460X5 T0801P	• • CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C86		1
-174	SK801460X5 T0801P	• • CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C82		1
-175	SK801460X5 T0801P	• • CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C85		1
-176	SK801460X5 T0801P	• • CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C84		1
-177	SK801460X5 T0801P	• • CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C83		1
-178	SK801460X5 T0801P	• • CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C81		1
-179	SK801460X5 T0801P	• • CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C80		1
-180	553-6487-00	• • PLATE, MTG, CAPACITOR		1

FIG.-ITEM	PART NO.	1 2 3 4 5 6 7 NOMENCLATURE	USAGE CODE	UNITS PER ASSY.
R 13 -180A	RC07GF473K	• RESISTOR, FXD, 47,000 OHMS 10%, 1/4 W V01121 745-0809-00 R138 EFF MCN 568 FSB NO. 3		1
-181	553-6516-004	• TUNING MATRIX SUBASSEMBLY SEE FIG. 18		1
		ATTACHING PARTS		
	MS35216-1	• SCREW, MACH. V77250 343-0122-00		2
		– – * – –		
-182	540-9004-003	• POST, ELECTRICAL-MECHANICAL EQUIP.		1
-183	540-9006-003	• POST, ELECTRICAL-MECHANICAL EQUIP.		1
		ATTACHING PARTS FOR 182 AND 183		
	MS35200-1	• SCREW, MACH. V77250 342-0131-00		2
		– – * – –		
-184	RN60B1623F	• RESISTOR, FXD, 162,000 OHMS 1%, 1/8 W V75042 705-6702-00 R69A		1
-185	714-1755-00	• RESISTOR, THRM, 400 OHMS 10%, 0.5 W RT2		1
R -186	33C41	• CAPACITOR, FXD, 100,000 UUF 80-20%, 50 VDCW V56289 913-3886-00 C142		1
-187	RS1A510R0G	• RESISTOR, FXD, 510 OHMS 3%, 1 W V91637 747-1248-00 R71		1
-188	RS1A510R0G	• RESISTOR, FXD, 510 OHMS 3%, 1 W V91637 747-1248-00 R72		1
-189	RS1A510R0G	• RESISTOR, FXD, 510 OHMS 3%, 1 W V91637 747-1248-00 R73		1
-190	RS1A510R0G	• RESISTOR, FXD, 510 OHMS 3%, 1 W V91637 747-1248-00 R74		1
-191	RS1A510R0G	• RESISTOR, FXD, 510 OHMS 3%, 1 W V91637 747-1248-00 R75		1
-192	MEA1782D	• RESISTOR, FXD, 17,800 OHMS 0.5%, 1/8 W V75042 705-0610-00 R69		1
-193	MEA222700D	• RESISTOR, FXD, 222,700 OHMS 0.5%, 1/8 W V75042 705-0609-00 R68		1
-194	10F12	• FILTER, BAND PASS V00222 241-0458-00 FL1		1
-195	2N697	• TRANSISTOR V07933 352-0494-00 Q10		1
-196	BC3179	• FILTER, BAND PASS V97315 673-0963-00 FL4		1
-197	10F13	• FILTER, BAND PASS V00222 241-0459-00 FL2		1
-198	2N697	• TRANSISTOR V07933 352-0494-00 Q19		1
-199	2N697	• TRANSISTOR V07933 352-0494-00 Q20		1
R -200	AB404D	• TERMINAL, UNINSULATED, GROUND V12615 306-1309-00		9
R	MS35649-24	• NUT, PLAIN, HEX. V77250 313-0037-00		9
R	COML	• WASHER, LOCK 310-0075-00		9
R -201	G4777-10	• TERMINAL, STUD V12615 306-1018-00		9
R -201A	389-77-10	• TERMINAL, STUD V12615 306-2206-00		3
		ATTACHING PARTS FOR 201 AND 201A		
	MS35200-2	• SCREW, MACH. V77250 342-0132-00		12
		– – * – –		
-202	SPL4040-4HOT TINNED	• TERMINAL, LUG V77147 304-0332-00		7
		ATTACHING PARTS		
	68-1660-40	• NUT, SELF-LKG, HEX. V72962 333-0605-00		8
	1704-03-00-4102	• WASHER, LOCK V78189 373-0006-00		7
		– – * – –		
-203	SPL4040-4HOT TINNED	• TERMINAL, LUG V77147 304-0332-00		1

	FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
	13 -204	506-8501-00	• STRAP, RETAINING		1
			ATTACHING PARTS FOR 203 AND 204		
		68-1660-40	• NUT, SELF-LKG, HEX. V72962 333-0605-00		1
		1704-03-00-4102	• WASHER, LOCK V78189 373-0006-00		1
			- - * - -		
	-205	AB396-1	• TERMINAL, STUD V12615 306-1281-00		1
			ATTACHING PARTS		
		MS35200-2	• SCREW, MACH. V77250 342-0132-00		1
			- - * - -		
	-206	G4777-10	• TERMINAL, STUD V12615 306-1018-00		1
	-207	SPL4040-4HOT TINNED	• TERMINAL, LUG V77147 304-0332-00		1
			ATTACHING PARTS		
		MS35200-2	• SCREW, MACH. V77250 342-0132-00		1
		COML	• WASHER, LOCK 310-0075-00		1
			- - * - -		
	-208	AB406D	• TERMINAL, NON-INSULATED, GROUND V12615 306-1311-00		1
	-209	AB405D	• TERMINAL, UNINSULATED, GROUND V12615 306-1310-00		1
			ATTACHING PARTS FOR 208 AND 209		
		MS35649-24	• NUT, PLAIN, HEX. V77250 313-0037-00		2
		COML	• WASHER, LOCK 310-0075-00		2
			- - * - -		
	-210	COML	• SCREW, MACH. 343-0172-00		2
	-211	MS35216-26	• SCREW, MACH. V77250 343-0170-00		1
			ATTACHING PARTS FOR 210 AND 211		
		553-2411-002	• NUT, BLANK		3
		COML	• WASHER, FLAT 310-0046-00		3
			- - * - -		
	-212	553-6532-005P	• CHASSIS, ELECTRICAL EQUIP.		1
	-213	102-130	• • TERMINAL, STUD V12615 306-0900-00		11
R	-214	SL173-197	• • TERMINAL, STANDOFF V12615 306-1261-00		30
	-215	SL174-198	• • TERMINAL, FEEDTHRU V12615 306-1271-00		8
	-216	100-200-14-2	• • CLIP, SPG TENS V99378 139-2236-00		1
			ATTACHING PARTS		
		MS20426AD3-2	• • RIVET, SOLID V12014 305-1360-00		2
			- - * - -		
	-217	3307X	• • SOCKET, TSTR V91662 352-9903-00 XQ10 THRU XQ16, XQ18 THRU XQ20		10
			ATTACHING PARTS		
		757	• • RETAINER, TSTR SOC V91662 352-9904-00		10
			- - * - -		
	-218	A1444HOT TINNED	• • EYELET, METALLIC V57771 307-1217-00		1
	-219	SE73CADPL	• • EYELET, METALLIC V07707 307-1060-00		1
	-220	553-6531-005P	• • CHASSIS, ELECTRICAL EQUIP.		1
	14 -	553-6515-004	AMPLIFIER-FILTER-MIXER ASSY SEE FIG. 13-42 FOR NHA		REF
	- 1	RC07GF104K	• RESISTOR, FXD, 100,000 OHMS 10%, 1/4 W V01121 745-0821-00 R1		1
R	- 2		DELETED		
	- 3	4007-8HOT TINNED	• TERMINAL, LUG V77147 304-0017-00		4
R	- 4		DELETED		

Figure 14 (Sheet 1 of 2) deleted.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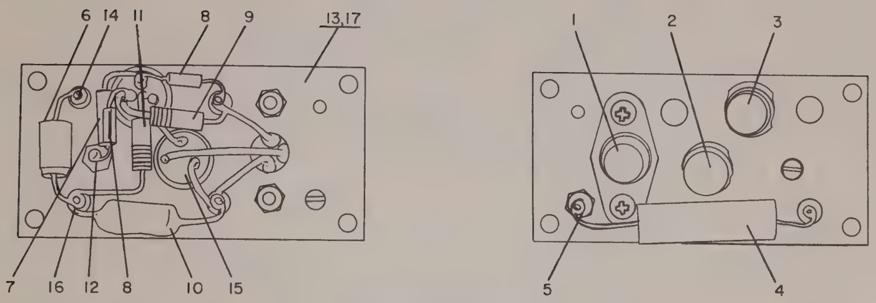
Amplifier-Filter-Mixer Assembly
Figure 14

	FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
	14 - 4A	GA2-0UUFPORM 5PCT	• CAPACITOR, FXD, 2 UUF 5%, 500 VDCW V78488 913-2984-00 C5 EFF MCN 107		1
	- 5	RC07GF104K	• RESISTOR, FXD, 100,000 OHMS 10%, I/4 W V01121 745-0821-00 R2		1
R	- 6		DELETED		
	- 7	RC07GF104K	• RESISTOR, FXD, 100,000 OHMS 10%, 1/4 W V01121 745-0821-00 R3		1
	- 8	CK60AW102M	• CAPACITOR, FXD, 1000 UUF 20%, 500 VDCW V01939 913-1186-00 C14		1
	- 9	MC80V102AM	• CAPACITOR, FXD, 1000 UUF 20%, 100 VDCW V96095 913-3019-00 C18		1
	- 10	RC07GF104K	• RESISTOR, FXD, 100,000 OHMS 10%, 1/4 W V01121 745-0821-00 R7		1
	- 11	CK60AW102M	• CAPACITOR, FXD, 1000 UUF 20%, 500 VDCW V01939 913-1186-00 C22		1
R	- 12		DELETED		
	- 13	CK60AW102M	• CAPACITOR, FXD, 1000 UUF 20%, 500 VDCW V01939 913-1186-00 C23		1
	- 14	553-6458-002P	• COIL, RF L5		1
R	- 15		DELETED		
	- 15A	MA4529	• CAPACITOR, VOLTAGE VAR, 10 UUF 10%, -30 VDCW V96341 922-6057-00 C20 EFF THRU MCN 319		1
	- 15A	MA4394	• CAPACITOR, VOLTAGE VAR, 10 UUF 1.0 UUF, -30 VDC V96341 922-6074-00 C20 EFF MCN 320		1
	- 16	M23-1000M	• CAPACITOR, FXD, 1000 UUF 20%, 500 VDCW V53021 912-0668-00 C21		1
	- 17	RC07GF272K	• RESISTOR, FXD, 2700 OHMS 10%, 1/4 W V01121 745-0764-00 R6		1
	- 18	CK60AW102M	• CAPACITOR, FXD, 1000 UUF 20%, 500 VDCW V01939 913-1186-00 C17		1
	- 19	M23-1000M	• CAPACITOR, FXD, 1000 UUF 20%, 500 VDCW V53021 912-0668-00 C13		1
R	- 20		DELETED		
	-20A	MA4529	• CAPACITOR, VOLTAGE VAR, 10 UUF 10%, -30 VDCW V96341 922-6057-00 C12 EFF THRU MCN 319		1
	- 20A	MA4394	• CAPACITOR, VOLTAGE VAR, 10 UUF 1.0 UUF, -30 VDC V96341 922-6074-00 C12 EFF MCN 320		1
R	- 21		DELETED		
R	- 21A	554-6756-002	• TRANSFORMER, R-F T7 EFF MCN 107		1
	- 22	553-6458-002P	• COIL, RF L2		1
R	- 23		DELETED		
	- 23A	MA4529	• CAPACITOR, VOLTAGE VAR, 10 UUF 10%, -30 VDCW V96341 922-6057-00 C6 EFF THRU MCN 319		1
	- 23A	MA4394	• CAPACITOR, VOLTAGE VAR, 10 UUF 1.0 UUF, -30 VDC V96341 922-6074-00 C6 EFF MCN 320		1
	- 24	M23-1000M	• CAPACITOR, FXD, 1000 UUF 20%, 500 VDCW V53021 912-0668-00 C7		1
	- 25	553-6458-002P	• COIL, RF L1		1
	- 26	M23-1000M	• CAPACITOR, FXD, 1000 UUF 20%, 500 VDCW V53021 912-0668-00 C2		1
R	- 27		DELETED		
	- 27A	MA4529	• CAPACITOR, VOLTAGE VAR, 10 UUF 10%, -30 VDCW V96341 922-6057-00 C1 EFF THRU MCN 319		1

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
14 – 27A	MA4394	• CAPACITOR, VOLTAGE VAR, 10 UUF 1.0 UUF, -30 VDC V96341 922-6074-00 C1 EFF MCN 320		1
R – 28		DELETED		
– 29	G4777-10	• TERMINAL, STUD V12615 306-1018-00 E76 THRU E79		4
		ATTACHING PARTS		
	COML	• SCREW, MACH. 343-0297-00		4
	COML	• WASHER, LOCK 310-0075-00		4
		– – * – –		
– 30	VCJ1022	• CAPACITOR, VAR, 2 TO 10 UUF, 500 VDCW V73899 922-3001-00 C4		1
– 31	VCJ1022	• CAPACITOR, VAR, 2 TO 10 UUF, 500 VDCW V73899 922-3001-00 C9		1
		ATTACHING PARTS FOR 30 AND 31		
	COML	• WASHER, LOCK 310-0081-00		2
		– – * – –		
– 32	RC07GF122K	• RESISTOR, FXD, 1200 OHMS 10%, 1/4 W V01121 745-0752-00 R5		1
– 33	VCJ1022	• CAPACITOR, VAR, 2 TO 10 UUF, 500 VDCW V73899 922-3001-00 C11		1
		ATTACHING PARTS		
	COML	• WASHER, LOCK 310-0081-00		1
		– – * – –		
– 34	2N2398	• TRANSISTOR V87216 352-0406-00 Q1		1
– 35	RC07GF222K	• RESISTOR, FXD, 2200 OHMS 10%, 1/4 W V01121 745-0761-00 R10		1
– 36	VCJ1022	• CAPACITOR, VAR, 2 TO 10 UUF, 500 VDCW V73899 922-3001-00 C19		1
		ATTACHING PARTS		
	COML	• WASHER, LOCK 310-0081-00		1
		– – * – –		
– 37	2N2398	• TRANSISTOR V87216 352-0406-00 Q2		1
– 38	RC07GF223K	• RESISTOR, FXD, 22,000 OHMS 10%, 1/4 W V01121 745-0797-00 R9		1
– 39	RC07GF104K	• RESISTOR, FXD, 100,000 OHMS 10%, 1/4 W V01121 745-0821-00 R8		1
– 40	CK60AW102M	• CAPACITOR, FXD, 1000 UUF 20%, 500 VDCW V01939 913-1186-00 C8		1
– 41	CK60AW102M	• CAPACITOR, FXD, 1000 UUF 20%, 500 VDCW V01939 913-1186-00 C16		1
– 42		DELETED		
– 42A	M23-1000M	• CAPACITOR, FXD, 1000 UUF 20%, 500 VDCW V53021 912-0668-00 C15 EFF MCN 107		1
– 43	RC07GF472K	• RESISTOR, FXD, 4700 OHMS 10%, 1/4 W V01121 745-0773-00 R4		1
– 43A	DM53740-5000	• CONNECTOR, PLUG V71468 371-0183-00		1
– 44	553-6511-004	• CHASSIS, ELECTRICAL EQUIP.		1
– 45	3307	• • SOCKET, TSTR V91662 352-9902-00 XQ1, XQ2		2
		ATTACHING PARTS		
	757	• • RETAINER, TSTR SOC V91662 352-9904-00		2
		– – * – –		
– 46	SL158-198	• • TERMINAL, FEEDTHRU V12615 306-1270-00		3
– 47	SL157-197	• • TERMINAL, STANDOFF V12615 306-1260-00		2
R – 47A		DELETED		
R – 47B		DELETED		
– 47B	SL180-231	• • TERMINAL, FEEDTHRU V12615 306-1272-00 EFF MCN 107		1
– 48	553-6510-004	• • CHASSIS, ELECTRICAL EQUIP.		1

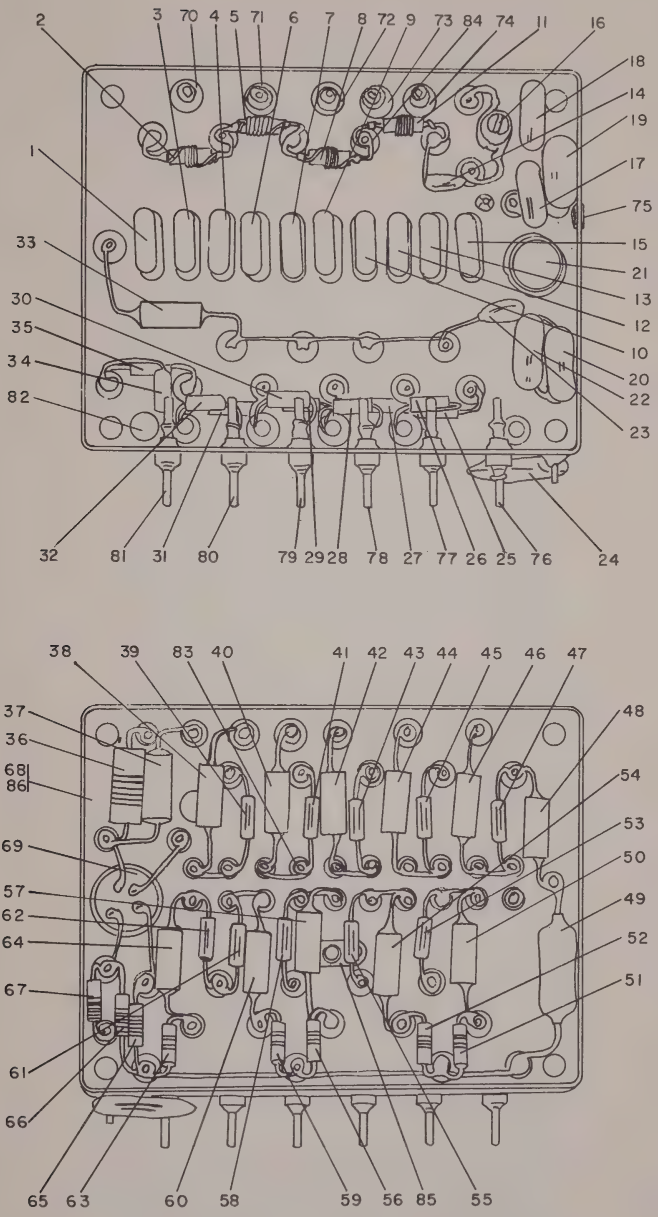


Voltage Regulator
Figure 15

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
15 -	553-6496-003	VOLTAGE REGULATOR SEE FIG. 13-43 FOR NHA		REF
- 1	2N2201	. TRANSISTOR V03508 352-0428-00 Q9		1
		ATTACHING PARTS		
	MS35649-24	. NUT, PLAIN, HEX. V77250 313-0037-00		2
	COML	. WASHER, LOCK 310-0075-00		2
	MS35216-[illegible]	. SCREW, MACH. V77250 343-0124-00		2
		- - * - -		
- 2	2N657A	. TRANSISTOR V03508 352-0354-00 Q8		1
- 3	2N697	. TRANSISTOR V96214 352-0197-00 Q7		1
- 4	29F2221G2	. CAPACITOR, FXD, 1.2 UF 15%, 250 VDCW V06001 184-8194-00 C139		1
- 5	AB404D	. TERMINAL, UNINSULATED, GROUND V12615 306-1309-00		1
		ATTACHING PARTS		
	MS35649-24	. NUT, PLAIN, HEX. V77250 313-0037-00		1
	COML	. WASHER, LOCK 310-0075-00		1
		- - * - -		
- 6	1N3255	. SEMICONDUCTOR DEVICE, DIO V49671 353-3276-00 CR61		1
- 7	RC20GF122K	. RESISTOR, FXD, 1200 OHMS 10%, 1/2 W V53021 745-1356-00 R64		1
- 8	SZ886	. SEMICONDUCTOR DEVICE, DIO V04713 353-3401-00 CR59, CR60		1

* MATCHED PAIR.

FIG-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
15 - 9	RC20GF102K	• RESISTOR, FXD, 1000 OHMS 10%, 1/2 W V01121 745-1352-00 R63		1
- 10	RW69V5R6	• RESISTOR, FXD, 5.6 OHMS 5%, 3 W V91637 747-5315-00 R66 EFF THRU MCN 106		1
- 10	RW69V4R7	• RESISTOR, FXD, 4.7 OHMS 5%, 3 W V91637 747-5368-00 R66 EFF MCN 107		1
- 11	RC20GF222K	• RESISTOR, FXD, 2200 OHMS 10%, 1/2 W V01121 745-1366-00 R65		1
- 12	AB404D	• TERMINAL, UNINSULATED, GROUND V12615 306-1309-00		1
		ATTACHING PARTS		
	MS35649-24	• NUT, PLAIN, HEX. V77250 313-0037-00		1
	COML	• WASHER, LOCK 310-0075-00		1
		- - * - -		
- 13	553-6485-003P	• TERMINAL BOARD TB2		1
- 14	SL157-197	• • TERMINAL, STANDOFF V12615 306-1260-00		3
- 15	3307X	• • SOCKET, TSTR V91662 352-9903-00 XQ7, XQ8		2
		ATTACHING PARTS		
	757	• • RETAINER, TSTR SOC V91662 352-9904-00		2
		- - * - -		
R - 16	SL158-198	• • TERMINAL, FEEDTHRU V12615 306-1270-00		2
- 17	553-6484-003P	• • TERMINAL BOARD		1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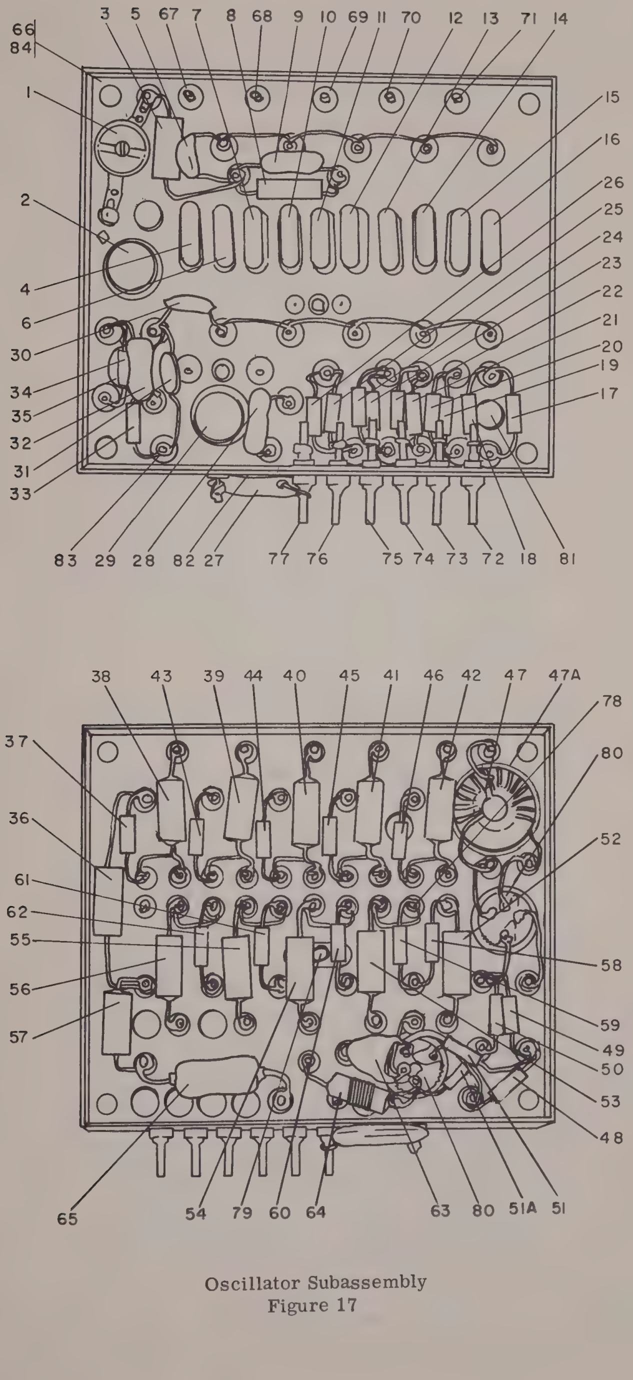
Oscillator Subassembly
Figure 16

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
16 -	553-6514-004P	OSCILLATOR SUBASSEMBLY SEE FIG. 13-49 FOR NHA		REF
- 1	M9-4342	. CRYSTAL UNIT, QTZ V85675 289-4342-00 Y11		1
- 2	553-6489-003P	. COIL, RF L31		1
- 3	M9-4343	. CRYSTAL UNIT, QTZ V85675 289-4343-00 Y12		1
- 4	M9-4344	. CRYSTAL UNIT, QTZ V85675 289-4344-00 Y13		1
- 5	553-6489-003P	. COIL, RF L30		1
- 6	M9-4345	. CRYSTAL UNIT, QTZ V85675 289-4345-00 Y14		1
- 7	M9-4346	. CRYSTAL UNIT, QTZ V85675 289-4346-00 Y15		1
- 8	553-6490-003P	. COIL, RF L29		1
- 9	M9-4347	. CRYSTAL UNIT, QTZ V85675 289-4347-00 Y16		1
- 10	M9-4348	. CRYSTAL UNIT, QTZ V85675 289-4348-00 Y17		1
- 11	553-6490-003P	. COIL, RF L28		1
- 12	M9-4349	. CRYSTAL UNIT, QTZ V85675 289-4349-00 Y18		1
- 13	M9-4350	. CRYSTAL UNIT, QTZ V85675 289-4350-00 Y19		1
- 14	CK60AW102M	. CAPACITOR, FXD, 1000 UUF 20%, 500 VDCW V01939 913-1186-00 C53		1
- 15	M9-4351	. CRYSTAL UNIT, QTZ V85675 289-4351-00 Y20		1
- 16	553-6461-002	. COIL, RF L27		1
- 17	CM05F101J03	. CAPACITOR, FXD, 100 UUF 5%, 500 VDCW V72136 912-2816-00 C91		1
- 18	CM05F221J03	. CAPACITOR, FXD, 220 UUF 5%, 500 VDCW V72136 912-2840-00 C52		1
- 19	CM05E200J03	. CAPACITOR, FXD, 20 UUF 5%, 500 VDCW V72136 912-2765-00 C51		1
- 20	CM05F331J03	. CAPACITOR, FXD, 330 UUF 5%, 500 VDCW V72136 912-2852-00 C48		1
- 21	2N2362	. TRANSISTOR V87216 352-0407-00 Q5		1
- 22	CM05F331J03	. CAPACITOR, FXD, 330 UUF 5%, 500 VDCW V72136 912-2852-00 C49		1
- 23	CK60AW102M	. CAPACITOR, FXD, 1000 UUF 20%, 500 VDCW V01939 913-1186-00 C47		1
R - 24	33C41	. CAPACITOR, FXD, 100,000 UUF +80-20%, 50 VDCW V56289 913-3886-00 C134		1
- 25	RC07GF181K	. RESISTOR, FXD, 180 OHMS 10%, 1/4 W V01121 745-0722-00 R46		1
- 26	1N647	. SEMICONDUCTOR DEVICE, DIO V03877 353-2596-00 CR51		1
- 27	RC07GF181K	. RESISTOR, FXD, 180 OHMS 10%, 1/4 W V01121 745-0722-00 R45		1
- 28	1N647	. SEMICONDUCTOR DEVICE DIO V03877 353-2596-00 CR50		1
- 29	RC07GF181K	. RESISTOR, FXD, 180 OHMS 10%, 1/4 W V01121 745-0722-00 R49		1
- 30	1N647	. SEMICONDUCTOR DEVICE, DIO V03877 353-2596-00 CR54		1
- 31	RC07GF181K	. RESISTOR, FXD, 180 OHMS 10%, 1/4 W V01121 745-0722-00 R48		1
- 32	1N647	. SEMICONDUCTOR DEVICE, DIO V03877 353-2596-00 CR53		1

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
16 - 33	WEE100	. COIL, RF, 100 UH V72259 240-1185-00 L26		1
- 34	1N647	. SEMICONDUCTOR DEVICE, DIO V03877 353-2596-00 CR52		1
- 35	RC07GF181K	..RESISTOR, FXD, 180 OHMS 10%, 1/4 W V01121 745-0722-00 R47		1
- 36	J301-500	. COIL, RF, 500 UH V76487 240-2533-00 L25		1
- 37	10100-131	. COIL, RF, 2.70 UH V82142 240-0069-00 L24 EFF THRU MCN 106		1
- 37	MS16225-11	. COIL, RF, 2.20 UH V82142 240-1572-00 L24 EFF MCN 107		1
- 38	WEE100	. COIL, RF, 100 UH V72259 240-1185-00 L38		1
- 39	1N270	. SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR43		1
- 40	WEE100	. COIL, RF, 100 UH V72259 240-1185-00 L39		1
- 41	1N270	. SEMICONDUCTOR DEVICE, DIO 03877 353-2018-00 CR44		1
- 42	WEE100	. COIL, RF, 100 UH V72259 240-1185-00 L40		1
- 43	1N270	. SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR45		1
- 44	WEE100	. COIL, RF, 100 UH V72259 240-1185-00 L41		1
- 45	1N270	. SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR46		1
- 46	WEE100	. COIL, RF, 100 UH V72259 240-1185-00 L42		1
- 47	1N270	. SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR47		1
- 48	WEE100	. COIL, RF, 100 UH V72259 240-1185-00 L32		1
- 49	RW69V151	. RESISTOR, FXD, 150 OHMS 5%, 3 W V91637 747-5385-00 R44		1
- 50	WEE100	. COIL, RF, 100 UH V72259 240-1185-00 L35		1
- 51	RC07GF103K	. RESISTOR, FXD, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 R52		1
- 52	RC07GF103K	. RESISTOR, FXD, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 R51		1
- 53	1N270	. SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR40		1
- 54	WEE100	. COIL, RF, 100 UH V72259 240-1185-00 L36		1
- 55	1N270	. SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR41		1
- 56	RC07GF103K	. RESISTOR, FXD, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 R50		1
- 57	WEE100	. COIL, RF, 100 UH V72259 240-1185-00 L37		1
- 58	1N270	. SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR42		1
- 59	RC07GF103K	. RESISTOR, FXD, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 R54		1
- 60	WEE100	. COIL, RF, 100 UH V72259 240-1185-00 L33		1
- 61	1N270	. SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR38		1
- 62	1N270	. SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR39		1
- 63	RC07GF103K	. RESISTOR, FXD, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 R53		1
- 64	WEE100	. COIL, RF, 100 UH V72259 240-1185-00 L34		1
- 65	RC07GF562K	. RESISTOR, FXD, 5600 OHMS 10%, 1/4 W V01121 745-0776-00 R42		1
- 66	RC07GF393K	. RESISTOR, FXD, 39,000 OHMS 10%, 1/4 W V01121 745-0806-00 R41		1
- 67	RC07GF333K	. RESISTOR, FXD, 33,000 OHMS 10%, 1/4 W V01121 745-0803-00 R43		1
- 68	553-6523-005P	. CHASSIS, ELECTRICAL EQUIP.		1
- 69	3307	. . SOCKET, TSTR V91662 352-9902-00 XG5		1

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
16		ATTACHING PARTS		
	757	. . RETAINER, TSTR SOC V91662 352-9904-00		1
		- - * - -		
- 70	SK801460X5 T0801P	. . CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C58		1
- 71	SK801460X5 T0801P	. . CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C57		1
- 72	SK801460X5 T0801P	. . CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C56		1
- 73	SK801460X5 T0801P	. . CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C55		1
- 74	SK801460X5 T0801P	. . CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C54		1
- 75	A1444HOT TINNED	. . EYELET, METALLIC V57771 307-1217-00		1
- 76	SK801460X5 T0801P	. . CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C50		1
- 77	SK801460X5 T0801P	. . CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C60		1
- 78	SK801460X5 T0801P	. . CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C59		1
- 79	SK801460X5 T0801P	. . CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C63		1
- 80	SK801460X5 T0801P	. . CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C62		1
- 81	SK801460X5 T0801P	. . CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C61		1
- 82	SL157-197	. . TERMINAL, STANDOFF V12615 306-1260-00		11
- 83	RFTSM52B2	. . TERMINAL, FEEDTHRU V12615 306-1291-00		20
- 84	SL158-198	. . TERMINAL, FEEDTHRU V12615 306-1270-00		20
- 85	LHTA51M2860-40	. . NUT, SELF-LKG, PLATE V72962 333-1016-00		1
		ATTACHING PARTS		
	MS20426AD2-2	. . RIVET, SOLID V12014 305-1351-00		2
		- - * - -		
- 86	553-6522-005P	. . CHASSIS, ELECTRICAL EQUIP.		1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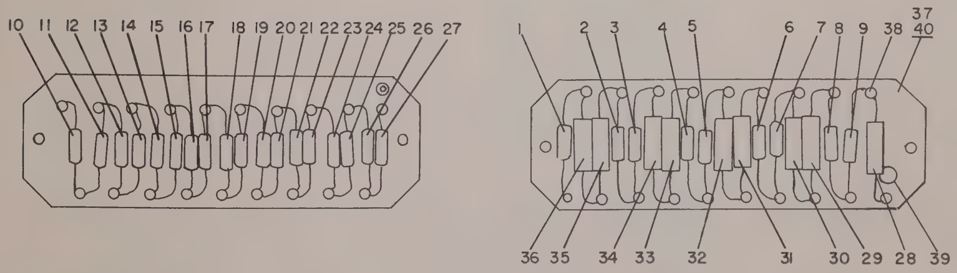
Oscillator Subassembly
Figure 17

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
17 -	553-6513-004	OSCILLATOR SUBASSEMBLY SEE FIG. 13-154 FOR NHA		REF
- 1	538002C0P0 89R	. CAPACITOR, VAR, 2 TO 8 UUF, 350 VDCW V72982 917-1228-00 C32		1
- 2	2N2362	. TRANSISTOR V87216 352-0407-00 Q4		1
- 3	1840-02	. COIL, RF, 0.22 UH V99800 240-0067-00 L10		1
- 4	M9-4361	. CRYSTAL UNIT, QTZ V85675 289-4361-00 Y10		1
- 5	CK60AW102M	. CAPACITOR, FXD, 1000 UUF 20%, 500 VDCW V01939 913-1186-00 C34		1
- 6	M9-4360	. CRYSTAL UNIT, QTZ V85675 289-4360-00 Y9		1
- 7	M9-4359	. CRYSTAL UNIT, QTZ V85675 289-4359-00 Y8		1
- 8	10100-125	. COIL, RF, 0.33 UH V82142 240-0068-00 L11		1
- 9	DM15C100J01	. CAPACITOR, FXD, 10 UUF 5%, 500 VDCW V72136 912-2753-00 C33 EFF THRU MCN 212 ONLY		1
- 10	M9-4358	. CRYSTAL UNIT, QTZ V85675 289-4358-00 Y7		1
- 11	M9-4357	. CRYSTAL UNIT, QTZ V85675 289-4357-00 Y6		1
- 12	M9-4356	. CRYSTAL UNIT, QTZ V85675 289-4356-00 Y5		1
- 13	M9-4355	. CRYSTAL UNIT, QTZ V85675 289-4355-00 Y4		1
- 14	M9-4354	. CRYSTAL UNIT, QTZ V85675 289-4354-00 Y3		1
- 15	M9-4353	. CRYSTAL UNIT, QTZ V85675 289-4353-00 Y2		1
- 16	M9-4352	. CRYSTAL UNIT, QTZ V85675 289-4352-00 Y1		1
- 17	RC07GF103K	. RESISTOR, FXD, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 R37		1
- 18	RC07GF181K	. RESISTOR, FXD, 180 OHMS 10%, 1/4 W V01121 745-0722-00 R32		1
- 19	RC07GF103K	. RESISTOR, FXD, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 R38		1
- 20	RC07GF181K	. RESISTOR, FXD, 180 OHMS 10%, 1/4 W V01121 745-0722-00 R33		1
- 21	RC07GF103K	. RESISTOR, FXD, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 R36		1
- 22	RC07GF181K	. RESISTOR, FXD, 180 OHMS 10%, 1/4 W V01121 745-0722-00 R31		1
- 23	RC07GF103K	. RESISTOR, FXD, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 R34		1
- 24	RC07GF181K	. RESISTOR, FXD, 180 OHMS 10%, 1/4 W V01121 745-0722-00 R29		1
- 25	RC07GF103K	. RESISTOR, FXD, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 R35		1
- 26	RC07GF181K	. RESISTOR, FXD, 180 OHMS 10%, 1/4 W V53021 V01121 745-0722-00 R30		1
R - 27	**33C41**	**. CAPACITOR, FXD, 100,000 UUF +80-20%, 50 VDCW V56289 913-3886-00 C133**		1
- 28	DM15C100J01	. CAPACITOR, FXD, 10 UUF 5%, 500 VDCW V72136 912-2753-00 C35		1
- 29	2N2398	. TRANSISTOR V87216 352-0406-00 Q3		1
- 30	CK60AW102M	. CAPACITOR, FXD, 1000 UUF 20%, 500 VDCW V01939 913-1186-00 C28		1
- 31	CK60AW102M	. CAPACITOR, FXD, 1000 UUF 20%, 500 VDCW V01939 913-1186-00 C26 EFF THRU MCN 106		1
- 31	CM05E470J03	. CAPACITOR, FXD, 47 UUF 5%, 500 VDCW V72136 912-2792-00 C26 EFF MCN 107 THRU 154		1
- 31	CM05E200J03	. CAPACITOR, FXD, 20 UUF 5%, 500 VDCW V72136 912-2765-00 C26 EFF MCN 155 THRU 212		1

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
17 - 31	DM15C100J01	• CAPACITOR, FXD, 10 UUF 5%, 500 VDCW V72136 912-2753-00 C26 EFF MCN 213		1
- 32	DM15C100J01	• CAPACITOR, FXD, 10 UUF 5%, 500 VDCW V72136 912-2753-00 C29 EFF THRU MCN 212		1
- 32	DM10C050J	• CAPACITOR, FXD, 5 UUF 5%, 500 VDCW V72136 912-3836-00 C29 EFF MCN 213		1
- 33	RC07GF562K	• RESISTOR, FXD, 5600 OHMS 10%, 1/4 W V01121 745-0776-00 R23 EFF THRU MCN 106		1
- 33	RC07GF223K	• RESISTOR, FXD, 22,000 OHMS 10%, 1/4 W V01121 745-0797-00 R23 EFF MCN 107		1
- 34	RC07GF562K	• RESISTOR, FXD, 5600 OHMS 10%, 1/4 W V01121 745-0776-00 R26 EFF THRU MCN 154		1
- 34	RC07GF222K	• RESISTOR, FXD, 2200 OHMS 10%, 1/4 W V01121 745-0761-00 R26 EFF MCN 155 THRU 212		1
- 34	RC07GF562K	• RESISTOR, FXD, 5600 OHMS 10%, 1/4 W V01121 745-0776-00 R26 EFF MCN 213		1
- 35	CK60AW102M	• CAPACITOR, FXD, 1000 UUF 20%, 500 VDCW V01939 913-1186-00 C30		1
- 36	10100-127	• COIL, RF, 0.68 UH V82142 240-0061-00 L12		1
- 37	1N270	• SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR37		1
- 38	10102-110	• COIL, RF, 3.30 UH V82142 240-0065-00 L22		1
- 39	10102-110	• COIL, RF, 3.30 UH V82142 240-0065-00 L21		1
- 40	10102-110	• COIL, RF, 3.30 UH V82142 240-0065-00 L20		1
- 41	10102-11D	• COIL, RF, 3.30 UH V82142 240-0065-00 L19		1
- 42	10102-110	• COIL, RF, 3.30 UH V82142 240-0065-00 L18		1
- 43	1N270	• SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR36		1
- 44	1N270	• SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR35		1
- 45	1N270	• SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR34		1
- 46	1N270	• SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR33		1
- 47	553-6460-002	• COIL, RF L9		1
- 47A	553-6464-002	• BASE, COIL EFF MCN 107		1
- 48	RC07GF563K	• RESISTOR, FXD, 56,000 OHMS 10%, 1/4 W V01121 745-0812-00 R22		1
- 49	RC07GF393K	• RESISTOR, FXD, 39,000 OHMS 10%, 1/4 W V01121 745-0806-00 R25 EFF THRU MCN 154		1
- 49	RC07GF183K	• RESISTOR, FXD, 18,000 OHMS 10%, 1/4 W V01121 745-0794-00 R25 EFF MCN 155 THRU 212		1
- 49	RC07GF393K	• RESISTOR, FXD, 39,000 OHMS 10%, 1/4 W V01121 745-0806-00 R25 EFF MCN 213		1
- 50	RC07GF333K	• RESISTOR, FXD, 33,000 OHMS 10%, 1/4 W V01121 745-0803-00 R27		1
- 51	RC07GF272K	• RESISTOR, FXD, 2700 OHMS 10%, 1/4 W V01121 745-0764-00 R24		1

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
17 - 51A	RC07GF272K	• RESISTOR, FXD, 2700 OHMS 10%, 1/4 W V01121 745-0764-00 R21 EFF MCN 107		1
- 52	10102-110	• COIL, RF, 3.30 UH V82142 240-0065-00 L16		1
- 53	10102-110	• COIL, RF, 3.30 UH V82142 240-0065-00 L15		1
- 54	10102-110	• COIL, RF, 3.30 UH V82142 240-0065-00 L14		1
- 55	10102-110	• COIL, RF, 3.30 UH V82142 240-0065-00 L13		1
- 56	10102-110	• COIL, RF, 3.30 UH V82142 240-0065-00 L17		1
- 57	10102-110	• COIL, RF, 3.30 UH V82142 240-0065-00 L8		1
- 58	1N270	• SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR31		1
- 59	1N270	• SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR30		1
- 60	1N270	• SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR29		1
- 61	1N270	• SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR28		1
- 62	1N270	• SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR32		1
- 63	CK60AW102M	• CAPACITOR, FXD, 1000 UUF 20%, 500 VDCW V01939 913-1186-00 C27 EFF THRU MCN 106		1
- 63	855502X5G 0103P	• CAPACITOR, FXD, 10,000 UUF 80-20%, 100 VDCW V72982 913-3680-00 C27 EFF MCN 107		1
R - 63A		DELETED		
- 64	553-6459-002	• TRANSFORMER, RF T1		1
- 65	RW69V151	• RESISTOR, FXD, 150 OHMS 5%, 3 W V91637 747-5385-00 R28		1
- 66	553-6527-005P	• CHASSIS, ELECTRICAL EQUIP.		1
- 67	SK801460X5 T0801P	• • CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C45		1
- 68	SK801460X5 T0801P	• • CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C44		1
- 69	SK801460X5 T0801P	• • CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C43		1
- 70	SK801460X5 T0801P	• • CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C42		1
- 71	SK801460X5 T0801P	• • CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C41		1
- 72	SK801460X5 T0801P	• • CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C39		1
- 73	SK801460X5 T0801P	• • CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C40		1
- 74	SK801460X5 T0801P	• • CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C38		1
- 75	SK801460X5 T0801P	• • CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C36		1
- 76	SK801460X5 T0801P	• • CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C37		1
- 77	SK801460X5 T0801P	• • CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C31		1
- 78	RFTSM52B2	• • TERMINAL, FEEDTHRU V12615 306-1291-00		20
- 79	LHTA51M2860-40	• • NUT, SELF-LKG, PLATE V72962 333-1016-00		[illegible]

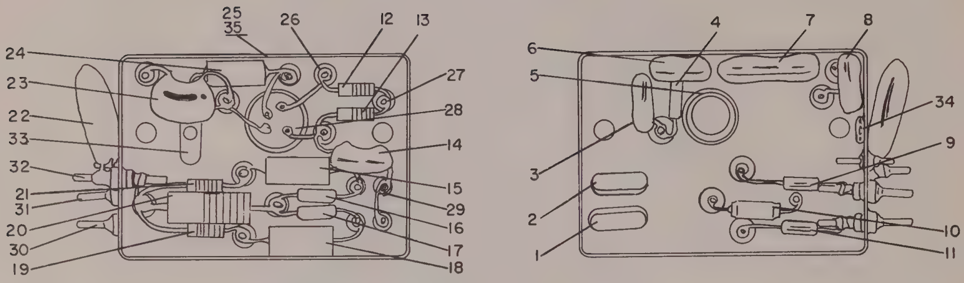
FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
17		ATTACHING PARTS		
	MS20426AD2-2	. . RIVET, SOLID V12014 305-1351-00		2
		- - * - -		
- 80	3307	. . SOCKET, TSTR V91662 352-9902-00 XQ3, XQ4		2
		ATTACHING PARTS		
	757	. . RETAINER, TSTR SOC V91662 352-9904-00		2
		- - * - -		
- 81	SL157-197	. . TERMINAL,STANDOFF V12615 306-1260-00		10
- 82	A1444HOT TINNED	. . EYELET, METALLIC V57771 307-1217-00		1
R - 83	SL158-198	. . TERMINAL, FEEDTHRU V12615 306-1270-00		22
- 84	553-6526-005P	. . CHASSIS, ELECTRICAL EQUIP.		1
18 -	553-6516-004	TUNING MATRIX SUBASSEMBLY SEE FIG. 13-181 FOR NHA		REF
- 1	1N484B	. SEMICONDUCTOR DEVICE, DIO V03877 353-2655-00 CR1		1
- 2	1N484B	. SEMICONDUCTOR DEVICE, DIO V03877 353-2655-00 CR4		1
- 3	1N484B	. SEMICONDUCTOR DEVICE, DIO V03877 353-2655-00 CR7		1
- 4	1N484B	. SEMICONDUCTOR DEVICE, DIO V03877 353-2655-00 CR10		1
R - 5	1N484B	. SEMICONDUCTOR DEVICE, DIO V03877 353-2655-00 CR13		1



Tuning Matrix Subassembly
Figure 18

FIG-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
R 18 - 6	1N484B	. SEMICONDUCTOR DEVICE, DIO V03877 353-2655-00 CR16		1
- 7	1N484B	. SEMICONDUCTOR DEVICE, DIO V03877 353-2655-00 CR19		1
- 8	1N484B	. SEMICONDUCTOR DEVICE, DIO V03877 353-2655-00 CR22		1
- 9	1N484B	. SEMICONDUCTOR DEVICE, DIO V03877 353-2655-00 CR25		1
- 10	1N484B	. SEMICONDUCTOR DEVICE, DIO V03877 353-2655-00 CR26		1
- 11	1N484B	. SEMICONDUCTOR DEVICE, DIO V03877 353-2655-00 CR27		1
- 12	1N484B	. SEMICONDUCTOR DEVICE, DIO V03877 353-2655-00 CR24		1
- 13	1N484B	. SEMICONDUCTOR DEVICE, DIO V03877 353-2655-00 CR23		1
- 14	1N484B	. SEMICONDUCTOR DEVICE, DIO V03877 353-2655-00 CR20		1
- 15	1N484B	. SEMICONDUCTOR DEVICE, DIO V03877 353-2655-00 CR21		1
- 16	1N484B	. SEMICONDUCTOR DEVICE, DIO V03877 353-2655-00 CR18		1
- 17	1N484B	. SEMICONDUCTOR DEVICE, DIO V03877 353-2655-00 CR17		1
- 18	1N484B	. SEMICONDUCTOR DEVICE, DIO V03877 353-2655-00 CR14		1
- 19	1N484B	. SEMICONDUCTOR DEVICE, DIO V03877 353-2655-00 CR15		1
- 20	1N484B	. SEMICONDUCTOR DEVICE, DIO V03877 353-2655-00 CR12		1
- 21	1N484B	. SEMICONDUCTOR DEVICE, DIO V03877 353-2655-00 CR11		1
- 22	1N484B	. SEMICONDUCTOR DEVICE, DIO V03877 353-2655-00 CR8		1
- 23	1N484B	. SEMICONDUCTOR DEVICE, DIO V03877 353-2655-00 CR9		1
- 24	1N484B	. SEMICONDUCTOR DEVICE, DIO V03877 353-2655-00 CR6		1
- 25	1N484B	. SEMICONDUCTOR DEVICE, DIO V03877 353-2655-00 CR5		1
- 26	1N484B	. SEMICONDUCTOR DEVICE, DIO V03877 353-2655-00 CR2		1
- 27	1N484B	. SEMICONDUCTOR DEVICE, DIO V03877 353-2655-00 CR3		1
- 28	MEA11258D	. RESISTOR, FXD, 11,258 OHMS 0.5%, 1/8 W V75042 705-0600-00 R20 EFF THRU MCN 319		1
- 28	705-0698-00	. RESISTOR, FXD, 14,320 OHMS 0.5%, 1/8 W R20 EFF MCN 320		1
- 29	MEA13504D	. RESISTOR, FXD, 13,504 OHMS 0.5%, 1/8 W V75042 705-0601-00 R19 EFF THRU MCN 319		1
- 29	705-0697-00	. RESISTOR, FXD, 16,950 OHMS 0.5%, 1/8 W R19 EFF MCN 320		1
- 30	MEA16407D	. RESISTOR, FXD, 16,407 OHMS 0.5%, 1/8 W V75042 705-0602-00 R18 EFF THRU MCN 319		1
- 30	705-0696-00	. RESISTOR, FXD, 20,360 OHMS 0.5%, 1/8 W R18 EFF MCN 320		1

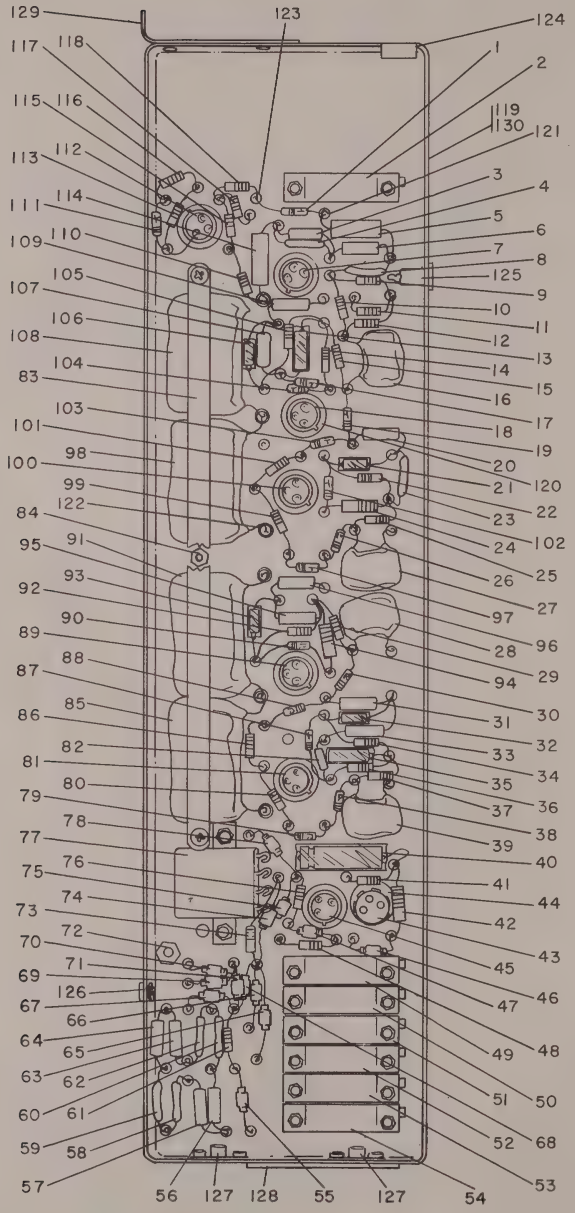
FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
18 - 31	MEA20334D	• RESISTOR, FXD, 20,334 OHMS 0.5%, 1/8 W V75042 705-0603-00 R17 EFF THRU MCN 319		1
- 31	705-0695-00	• RESISTOR, FXD, 24,960 OHMS 0.5%, 1/8 W R17 EFF MCN 320		1
- 32	MEA26622D	• RESISTOR, FXD, 26,622 OHMS 0.5%, 1/8 W V75042 705-0604-00 R16 EFF THRU MCN 319		1
- 32	705-0694-00	• RESISTOR, FXD, 31,380 OHMS 0.5%, 1/8 W R16 EFF MCN 320		1
- 33	MEA35052D	• RESISTOR, FXD, 35,052 OHMS 0.5%, 1/8 W V75042 705-0605-00 R15 EFF THRU MCN 319		1
- 33	705-0693-00	• RESISTOR, FXD, 41,100 OHMS 0.5%, 1/8 W R15 EFF MCN 320		1
- 34	MEA49615D	• RESISTOR, FXD, 49,615 OHMS 0.5%, 1/8 W V75042 705-0606-00 R14 EFF THRU MCN 319		1
- 34	705-0692-00	• RESISTOR, FXD, 57,400 OHMS 0.5%, 1/8 W R14 EFF MCN 320		1
- 35	MEA79675D	• RESISTOR, FXD, 79,675 OHMS 0.5%, 1/8 W V75042 705-0607-00 R13 EFF THRU MCN 319		1
- 35	705-0691-00	• RESISTOR, FXD, 89,800 OHMS 0.5%, 1/8 W R13 EFF MCN 320		1
- 36	MEA177120D	• RESISTOR, FXD, 177,120 OHMS 0.5%, 1/8 W V75042 705-0608-00 R12 EFF THRU MCN 319		1
- 36	705-0690-00	• RESISTOR, FXD, 188,100 OHMS 0.5%, 1/8 W R12 EFF MCN 320		1
- 37	553-6505-004	• TERMINAL BOARD TB1		1
- 38	G116-148	• • TERMINAL, FEEDTHRU V12615 306-1131-00		9
- 39	102-130	• • TERMINAL, STUD V12615 306-0900-00		20
- 40	553-6504-004	• • TERMINAL BOARD		1



Oscillator Subassembly
Figure 19

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
19 -	553-6512-004P	OSCILLATOR SUBASSEMBLY SEE FIG. 13-13 FOR NHA		REF
- 1	M9-4341	. CRYSTAL UNIT, QTZ V85675 289-4341-00 Y21		1
- 2	M9-4340	. CRYSTAL UNIT, QTZ V85675 289-4340-00 Y22		1
- 3	CM05F101J03	. CAPACITOR, FXD, 100 UUF 5%, 500 VDCW V72136 912-2816-00 C67		1
- 4	RC07GF822K	. RESISTOR, FXD, 8200 OHMS 10%, 1/4 W V01121 745-0782-00 R57		1
- 5	2N2362	. TRANSISTOR V87216 352-0407-00 Q6		1
- 6	CM05F221J03	. CAPACITOR, FXD, 220 UUF 5%, 500 VDCW V72136 912-2840-00 C70		1
- 7	DM20F222J 500WV	. CAPACITOR, FXD, 2200 UUF 5%, 500 VDCW V72136 912-3339-00 C69		1
- 8	CM05E470J03	. CAPACITOR, FXD, 47 UUF 5%, 500 VDCW V72136 912-2792-00 C97		1
- 9	1N647	. SEMICONDUCTOR DEVICE, DIO V03877 353-2596-00 CR58		1
- 10	STA552-1	. CAPACITOR, FXD, 100,000 UUF 20%, 35 VDCW V21520 184-7408-00 C65		1
- 11	1N647	. SEMICONDUCTOR DEVICE, DIO V03877 353-2596-00 CR57		1
- 12	RC07GF332K	. RESISTOR, FXD, 3300 OHMS 10%, 1/4 W V01121 745-0767-00 R58		1

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
19 - 13	RC07GF562K	. RESISTOR, FXD, 5600 OHMS 10%, 1/4 W V01121 745-0776-00 R56		1
- 14	CM05E470J03	. CAPACITOR, FXD, 47 UUF 5%, 500 VDCW V72136 912-2792-00 C66		1
- 15	J301-500	. COIL, RF, 500 UH V76487 240-2533-00 L44		1
- 16	1N270	. SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR55		1
- 17	1N270	. SEMICONDUCTOR DEVICE, DIO V03877 353-2018-00 CR56		1
- 18	J301-500	. COIL, RF, 500 UH V76487 240-2533-00 L45		1
- 19	RC07GF103K	. RESISTOR, FXD, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 R59		1
- 20	RC32GF561K	. RESISTOR, FXD, 560 OHMS 10%, 1 W V01121 745-3342-00 R61		1
- 21	RC07GF103K	. RESISTOR, FXD, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 R60		1
R - 22	33C41	. CAPACITOR, FXD, 100,000 UUF 80-20%, 50 VDCW V56289 913-3886-00 C132		1
- 23	DM15F471J03	. CAPACITOR, FXD, 470 UUF 5%, 330 VDCW V72136 912-2864-00 C68		1
- 24	10100-131	. COIL, RF, 2.70 UH V82142 240-0069-00 L46		1
- 25	553-6503-004	. CHASSIS, ELECTRICAL EQUIP.		1
- 26	SL158-198	. . TERMINAL, FEEDTHRU V12615 306-1270-00		6
- 27	SL157-197	. . TERMINAL, STANDOFF V12615 306-1260-00		4
- 28	3307	. . SOCKET, TSTR V91662 352-9902-00 XQ6		1
	757	. . RETAINER, TSTR SOC V91662 352-9904-00		1
		- - * - -		
- 29	RFTSM52B2	. . TERMINAL, FEEDTHRU V12615 306-1291-00		4
- 30	SK801460X5 T0801P	. . CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C72		1
- 31	SK801460X5 T0801P	. . CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C73		1
- 32	SK801460X5 T0801P	. . CAPACITOR, FXD, 800 UUF, 300 VDCW V72982 913-4454-00 C71		1
		ATTACHING PARTS		
- 33	LHTA51M2860-40	. . NUT, SELF-LKG, PLATE V72962 333-1016-00		1
		ATTACHING PARTS		
	MS20426AD2-2	. . RIVET, SOLID V12014 305-1351-00		2
		- - * - -		
- 34	A1444HOT TINNED	. . EYELET, METALLIC V57771 307-1217-00		1
- 35	553-6502-004	. . CHASSIS, ELECTRICAL EQUIP.		1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Instrumentation Landing System Test Subassembly
Figure 20

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
25 -	756-3816-005	INSTRUMENT LANDING SYSTEM TEST SUBASSEMBLY SEE FIG. 2-4 FOR NHA		REF
- 1	1N457	. SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR2		1
- 2	224L1-503	. RESISTOR, VAR, 50,000 OHMS 5%, 1/2 W V80294 381-1290-00 R7		1
		ATTACHING PARTS		
	68-1660-26	. NUT, SELF-LKG, HEX. V72962 333-0604-00		2
	MS35200-5	. SCREW, MACH. V77250 342-0135-00		2
		- - * - -		
- 3	RN60B1962F	. RESISTOR, FXD, 19,600 OHMS 1%, 1/8 W V75042 705-6658-00 R49		1
- 4	RN60B1103F	. RESISTOR, FXD, 110,000 OHMS 1%, 1/8 W V75042 705-6694-00 R54		1
- 5	TITM1-4 1K PORM10PCT	. RESISTOR, THRM, 1000 OHMS 10%, 1/4 W V96214 714-2360-00 RT1		1
- 6	RN60B1962F	. RESISTOR, FXD, 19,600 OHMS 1%, 1/8 W V75042 705-6658-00 R52		1
- 7	2N697	. TRANSISTOR V96214 352-0197-00 Q1		1
- 8	RN60B1103F	. RESISTOR, FXD, 110,000 OHMS 1%, 1/8 W V75042 705-6694-00 R46		1
- 9	RC07GF682K	. RESISTOR, FXD, 6800 OHMS 10%, 1/4 W V01121 745-0779-00 R43		1
- 10	RC07GF332K	. RESISTOR, FXD, 3300 OHMS 10%, 1/4 W V01121 745-0767-00 R41		1
- 11	RC07GF333K	. RESISTOR, FXD, 33,000 OHMS 10%, 1/4 W V01121 745-0803-00 R10		1
- 12	1N457	. SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR1		1
- 13	K15J20S	. CAPACITOR, FXD, 15 UF 20%, 20 VDCW V05397 184-7371-00 C7		1
- 14	RC07GF562K	. RESISTOR, FXD, 5600 OHMS 10%, 1/4 W V01121 745-0776-00 R14		1
- 15	RC07GF104K	. RESISTOR, FXD, 100,000 OHMS 10%, 1/4 W V01121 745-0821-00 R13		1
- 16	CM06F332J03	. CAPACITOR, FXD, 3300 UUF 5%, 500 VDCW V72136 912-3040-00 C5		1
- 17	1N457	. SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR31		1
R - 18	**2N697**	**. TRANSISTOR V96214 352-0197-00 Q3**		**1**
- 19	1N457	. SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR5		1
- 20	RN60B2151F	. RESISTOR, FXD, 2150 OHMS 1%, 1/8 W V75042 705-6612-00 R20		1
- 21	K1R5J20DS	. CAPACITOR, FXD, 1.5 UF 5%, 20 VDCW V05397 184-8330-00 C9		1
- 22	RC07GF272K	. RESISTOR, FXD, 2700 OHMS 10%, 1/4 W V01121 745-0764-00 R22		1
- 23	RN60B1332F	. RESISTOR, FXD, 13,300 OHMS 1%, 1/8 W V75042 705-6650-00 R21		1
- 24	RC20GF681K	. RESISTOR, FXD, 680 OHMS 10%, 1/2 W V53021 745-1345-00 R23		1
- 25	RC07GF104K	. RESISTOR, FXD, 100,000 OHMS 10%, 1/4 W V01121 745-0821-00 R24		1
- 26	1N457	. SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR10		1
- 27	CM06F332J03	. CAPACITOR, FXD, 3300 UUF 5%, 500 VDCW V72136 912-3040-00 C10		1
R - 28	CM06F332J03	. CAPACITOR, FXD, 3300 UUF 5%, 500 VDCW V72136 912-3040-00 C16		1

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
20 - 29	RC07GF104K	• RESISTOR, FXD, 100,000 OHMS 10%, 1/4 W V01121 745-0821-00 R40		1
- 30	1N457	• SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR15		1
- 31	RN60B2151F	• RESISTOR, FXD, 2150 OHMS 1%, 1/8 W V75042 705-6612-00 R31		1
- 32	K1J35DS	• CAPACITOR, FXD, 1 UF 5%, 35 VDCW V05397 184-8331-00 C12		1
- 33	RN60B8251F	• RESISTOR, FXD, 8250 OHMS 1%, 1/8 W V75042 705-6640-00 R30		1
- 34	RC07GF272K	• RESISTOR, FXD, 2700 OHMS 10%, 1/4 W V01121 745-0764-00 R29		1
- 35	K15J20S	• CAPACITOR, FXD, 15 UF 20%, 20 VDCW V05397 184-7371-00 C13		1
- 36	RC07GF562K	• RESISTOR, FXD, 5600 OHMS 10%, 1/4 W V01121 745-0776-00 R28		1
- 37	RC07GF104K	• RESISTOR, FXD, 100,000 OHMS 10%, 1/4 W V01121 745-0821-00 R27		1
- 38	1N457	• SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR11		1
R - 39	CM06F332J03	• CAPACITOR, FXD, 3300 UUF 5%, 500 VDCW V72136 912-3040-00 C11		1
- 40	CL25BN080UP3	• CAPACITOR, FXD, 8 UF 75-15%, 100 VDCW V56289 184-7248-00 C17		1
- 41	RC07GF102K	• RESISTOR, FXD, 1000 OHMS 10%, 1/4 W V01121 745-0749-00 R60		1
- 42	RC20GF220K	• RESISTOR, FXD, 22 OHMS 10%, 1/2 W V53021 745-1282-00 R61		1
- 43	2N657A	• TRANSISTOR V03508 352-0354-00 Q8		1
- 44	TXBP032-037-3	• HOLDER, SEMICONDUCTOR V98978 352-9885-00		1
- 45	2N697	• TRANSISTOR V96214 352-0197-00 Q7		1
- 46	1N647	• SEMICONDUCTOR DEVICE, DIO V03877 353-2596-00 CR30		1
- 47	1N755A	• SEMICONDUCTOR DEVICE, DIO V03877 353-2718-00 CR27		1
- 48	RC07GF122K	• RESISTOR, FXD, 1200 OHMS 10%, 1/4 W V01121 745-0752-00 R59		1
- 49	224L1-502	• RESISTOR, VAR, 5000 OHMS 5%, 1/2 W V80294 381-1287-00 R6		1
- 50	224L1-501	• RESISTOR, VAR, 500 OHMS 5%, 1/2 W V80294 381-1284-00 R5		1
- 51	224L1-502	• RESISTOR, VAR, 5000 OHMS 5%, 1/2 W V80294 381-1287-00 R4		1
- 52	224L1-103	• RESISTOR, VAR, 10,000 OHMS 5%, 1/2 W V80294 381-1288-00 R3		1
- 53	224L1-502	• RESISTOR, VAR, 5000 OHMS 5%, 1/2 W V80294 381-1287-00 R2		1
- 54	224L1-103	• RESISTOR, VAR, 10,000 OHMS 5%, 1/2 W V80294 381-1288-00 R1		1
		ATTACHING PARTS FOR 49 THRU 54		
	68-1660-26	• NUT, SELF-LKG, HEX. V72962 333-0604-00		12
	MS35216-5	• SCREW, MACH. V77250 343-0126-00		12
		- - * - -		
- 55	1N647	• SEMICONDUCTOR DEVICE, DIO V03877 353-2596-00 CR23		1
- 56	RN60B2151F	• RESISTOR, FXD, 2150 OHMS 1%, 1/8 W V75042 705-6612-00 R51		1
- 57	RN60B2151F	• RESISTOR, FXD, 2150 OHMS 1%, 1/8 W V75042 705-6612-00 R50		1

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
20 - 58	RN60B3831F	• RESISTOR, FXD, 3830 OHMS 1%, 1/8 W V75042 705-6624-00 R48		1
- 59	RN60B2371F	• RESISTOR, FXD, 2370 OHMS 1%, 1/8 W V75042 705-6614-00 R47		1
- 60	RN60B3831F	• RESISTOR, FXD, 3830 OHMS 1%, 1/8 W V75042 705-6624-00 R53		1
- 61	RC07GF102K	• RESISTOR, FXD, 1000 OHMS 10%, 1/4 W V01121 745-0749-00 R55		1
- 62	RN60B2371F	• RESISTOR, FXD, 2370 OHMS 1%, 1/8 W V75042 705-6614-00 R42		1
- 63	RN60B4220F	• RESISTOR, FXD, 422 OHMS 1%, 1/8 W V75042 705-6578-00 R44		1
- 64	RN60B4220F	• RESISTOR, FXD, 422 OHMS 1%, 1/8 W V75042 705-6578-00 R45		1
- 65	1N647	• SEMICONDUCTOR DEVICE, DIO V03877 353-2596-00 CR18		1
- 66	1N647	• SEMICONDUCTOR DEVICE, DIO V03877 353-2596-00 CR20		1
- 67	1N647	• SEMICONDUCTOR DEVICE, DIO V03877 353-2596-00 CR24		1
- 68	1N647	• SEMICONDUCTOR DEVICE, DIO V03877 353-2596-00 CR21		1
- 69	1N647	• SEMICONDUCTOR DEVICE, DIO V03877 353-2596-00 CR19		1
- 70	1N647	• SEMICONDUCTOR DEVICE, DIO V03877 353-2596-00 CR17		1
- 71	1N647	• SEMICONDUCTOR DEVICE, DIO V03877 353-2596-00 CR22		1
	756-3806-00	• WIRING HARNESS, BRANCHED		1
- 72	541-5177-002	• • BUTTON, CABLE ATTACHING PARTS		1
	MS35216-12	• • SCREW, MACH. V77250 343-0133-00 - - * - -		1
- 73	1N647	• SEMICONDUCTOR DEVICE, DIO V03877 353-2596-00 CR26		1
- 74	1N647	• SEMICONDUCTOR DEVICE, DIO V03877 353-2596-00 CR25		1
- 75	1N755A	• SEMICONDUCTOR DEVICE, DIO V03877 353-2718-00 CR28		1
- 76	RC07GF122K	• RESISTOR, FXD, 1200 OHMS 10%, 1/4 W V01121 745-0752-00 R58		1
- 77	3SAF1305	• RELAY, ARM. V01526 974-0822-00 K1 ATTACHING PARTS		1
	68-1660-40	• NUT, SELF-LKG, HEX. V72962 333-0605-00		1
	MS35216-12	• SCREW, MACH. V77250 343-0133-00 - - * - -		1
- 78	1N647	• SEMICONDUCTOR DEVICE, DIO V03877 353-2596-00 CR16		1
- 79	1N457	• SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR12		1
- 80	RC07GF103K	• RESISTOR, FXD, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 R33		1
- 81	2N697	• TRANSISTOR V96214 352-0197-00 Q5		1
- 82	1N457	• SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR32		1
- 83	756-3810-002	• STRAP, HOLD DOWN, CAPACITOR		1
- 84	540-9035-003	• POST, ELECTRICAL-MECHANICAL EQUIP. ATTACHING PARTS FOR 83 AND 84		3
	MS35216-11	• SCREW, MACH. V77250 343-0132-00		3
	MS35216-12	• SCREW, MACH. V77250 343-0133-00 - - * - -		3

FIG.-ITEM	PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
20 - 85	DM42F563J03	• CAPACITOR, FXD, 56,000 UUF 5%, 300 VDCW V72136 912-3148-00 C4		1
- 86	RC07GF103K	• RESISTOR, FXD, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 R38		1
- 87	1N457	• SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR29		1
- 88	1N457	• SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR13		1
- 89	2N697	• TRANSISTOR V96214 352-0197-00 Q6		1
- 90	1N457	• SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR14		1
- 91	DM42F563J03	• CAPACITOR, FXD, 56,000 UUF 5%, 300 VDCW 7M2136 912-3148-00 C3		1
- 92	RC07GF272K	• RESISTOR, FXD, 2700 OHMS 10%, 1/4 W V01121 745-0764-00 R30		1
- 93	K1J35DS	• CAPACITOR, FXD, 1 UF 5%, 35 VDCW V05397 184-8331-00 C15		1
- 94	RC20GF681K	• RESISTOR, FXD, 680 OHMS 10%, 1/2 W V01121 745-1345-00 R37		1
- 95	RN60B1212F	• RESISTOR, FXD, 12,100 OHMS 1%, 1/8 W V75042 705-6648-00 R35		1
- 96	RN60B2151F	• RESISTOR, FXD, 2150 OHMS 1%, 1/8 W V75042 705-6612-00 R34		1
- 97	1N457	• SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR8		1
- 98	DM42F563J03	• CAPACITOR, FXD, 56,000 UUF 5%, 300 VDCW V72136 912-3148-00 C2		1
- 99	RC07GF103K	• RESISTOR, FXD, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 R26		1
-100	2N697	• TRANSISTOR V96214 352-0197-00 Q4		1
-101	RC07GF103K	• RESISTOR, FXD, 10,000 OHMS 10%, 1/4 W V01121 745-0785-00 R19		1
-102	1N457	• SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR9		1
-103	1N457	• SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR7		1
-104	1N457	• SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR6		1
-105	RC07GF272K	• RESISTOR, FXD, 2700 OHMS 10%, 1/4 W V01121 745-0764-00 R15		1
-106	K1R5J20DS	• CAPACITOR, FXD, 1.5 UF 5%, 20 VDCW V05397 184-8330-00 C6		1
-107	RN60B1002F	• RESISTOR, FXD, 10,000 1%, 1/8 W V75042 705-6644-00 R16		1
-108	DM42F563J03	• CAPACITOR, FXD, 56,000 UUF 5%, 300 VDCW V72136 912-3148-00 C1		1
-109	RN60B2151F	• RESISTOR, FXD, 2150 OHMS 1%, 1/8 W V75042 705-6612-00 R17		1
-110	1N457	• SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR4		1
-111	1N457	• SEMICONDUCTOR DEVICE, DIO V03877 353-0204-00 CR3		1
-112	2N697	• TRANSISTOR V96214 352-0197-00 Q2		1
-113	RC07GF332K	• RESISTOR, FXD, 3300 OHMS 10%, 1/4 W V01121 745-0767-00 R8		1
-114	TITM1-4 1K PORM10PCT	• RESISTOR, THRM, 1000 OHMS 10%, 1/4 W V96214 714-2360-00 RT2		1
-115	RC07GF223K	• RESISTOR, FXD, 22,000 OHMS 10%, 1/4 W V01121 745-0797-00 R12		1
-116	RC07GF682K	• RESISTOR, FXD, 6800 OHMS 10%, 1/4 W V01121 745-0779-00 R11		1

FIG.-ITEM		PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY.
20	-117	RC07GF221K	• RESISTOR, FXD, 220 OHMS 10%, 1/4 W V01121 745-0725-00 R62		1
	-118	RC07GF223K	• RESISTOR, FXD, 22,000 OHMS 10%, 1/4 W V01121 745-0797-00 R9		1
	-119	756-3815-00	• CHASSIS, ELECTRICAL EQUIP.		1
	-120	A51043	• • HOLDER, TSTR V08289 139-2423-00		7
	-121	102-130	• • TERMINAL, STUD V12615 306-0900-00		1
	-122	SL157-197	• • TERMINAL, STANDOFF V12615 306-1260-00		6
	-123	SL283-230	• • TERMINAL, STANDOFF V12615 306-1265-00		81
	-124	756-3809-00	• • BUMPER, PLASTIC		1
			ATTACHING PARTS		
		COML	• • RIVET, TUBULAR 305-0045-00		1
			– – * – –		
	-125	SKT41WHT	• • JACK, TIP V98291 360-0256-00		1
	-126	A25HOTTINNED	• • EYELET, METALLIC V57771 307-1218-00		1
	-127	K1913-06	• • NUT, SELF-LKG, PLATE V75237 334-1033-00		2
	-128	756-3811-002	• • SPACER, BAR		1
			ATTACHING PARTS FOR 127 AND 128		
		MS20426AD3-3	• • RIVET, SOLID V12014 305-1361-00		1
		MS20426AD3-4	• • RIVET, SOLID V12014 305-1362-00		3
			– – * – –		
	-129	756-3807-002	• • BRACKET, ANGLE		1
			ATTACHING PARTS		
		R4008X5-32	• • RIVET, TUBULAR V12014 305-0008-00		2
			– – * – –		
	-130	756-3814-00	• • CHASSIS, ELECTRICAL EQUIP.		1

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